APRIL, 1933
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# Contractors and Engineers Monthly

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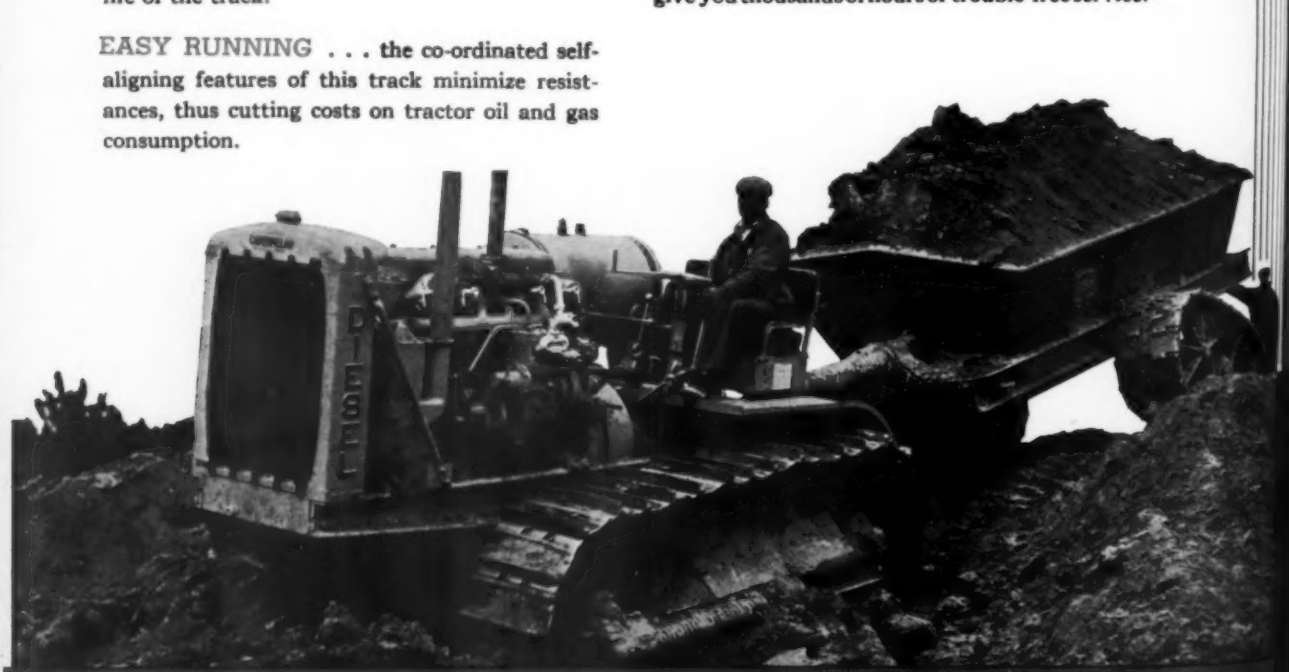
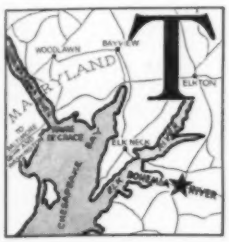



THE EUCLID ROAD MACHINERY COMPANY
CLEVELAND OHIO

*Time and Labor-Savers at Work*

# Building the Bohemia River Bridge

*Sanford & Brooks Co. of Baltimore, Md., Handled 1,136-Foot Bridge on Fast Schedule to Beat 200 Working Day Contract*




THE Bohemia River is an innocent enough looking stream most of the time and flows into the Elk River near the head of Chesapeake Bay, but when it starts to kick up with a stiff breeze, everything that floats must be moored securely. Sanford & Brooks Co., contractor for the new Bohemia River Bridge on Maryland State Route 213, learned this early in its work, for timber that was several feet above high water and supposedly stored away from all possible damage was washed away and retrieved only with difficulty. The 1,136-foot bridge with a 20-foot roadway is a reinforced concrete structure with 29 spans of 35 feet each and a double bascule span. The contract also called for a fill of 4,000 yards at the south end of the bridge and of 3,800 yards at the north end with a few hundred feet of paving at each end to connect the approaches with the existing highway.

The contractor started moving in his plant and began the preliminary layout of the job on October 16, 1931. The first work was 13,000 cubic yards of dredging in order to provide flotation for the contractor's plant. Following this the 45 to 77-foot precast concrete piles were driven with a floating pile driver equipped with 75-foot leads and a No. 0 Vulcan steam pile hammer. The concrete piles were cast at the contractor's own yard, Pier 10, in Baltimore and brought 60 miles on scows. Pile driving was started on December 16 and was finished on April 1, 1932, with the 220 piles in place. Driving was not continuous throughout this total period. There were 54 piles under each bascule pier, 4 for the operator's house and 27 bents of 4 piles each. The driving of the piles was exceedingly difficult even with jetting. The jetting pipe was a 2½-inch pipe

*General View of the Yard and Bridge from the South*

reduced to 1½ inches and carried 160 pounds pressure furnished by an old Worthington vertical high-pressure oil pump requiring a 2-inch steam line to operate it. The piles went through a layer of hardpan quite readily and then struck a stratum of "iron clay" that was like hard rubber. The underwater concreting started January 20, 1932, and was followed by the pouring of the first span on Leap Year Day, February 29, 1932. The bottom of each bascule pier started at Elev. 0.00 or mean low water. This had to be poured at a stage when there was no water in the forms. Hence there was no tremie concrete poured.

In the roadway span there were four reinforced concrete beams but in the spans adjacent to the bascule piers there were four 30-inch, 108-pound I-beams encased in concrete.

### FORM HANDLING

The contractor had six sets of forms for caps and six sets for the spans, including the centering, so that as soon as one of the spans was ready one of the sets of forms was dropped and carried forward on a barge to the next span to be poured. The centering consisted of two 30-inch I-beams suspended from the caps by a pair of 10-inch x 30.2-pound ship channels spaced 6 inches back to back and measuring 6 feet 10 inches long. The channels ran to the center of the cap and carried two 2-inch rods 4 inches apart which ran through to a 2-inch plate on which the 30-inch, 110-pound I-beam rested. The I-beams ran the full length of the span with a 4-inch clearance at each end which was wedged to hold the beam firm. The I-beams carried eight pieces of 8 x 14-inch timber 24 feet long bolted to the beams, which carried the forms for the bottom of the bridge deck. When the time came to remove the forms a pair of barges lashed together was floated under the span with cribbing carried up to within 6 inches of the bottom of the I-beam. The two bolts at each end on the channels were then slacked off and the channel pushed back to clear the caps. Then a jack was set on the top of the I-beam and jacked up against the forms just enough to loosen them so that they dropped with the I-beam onto the barges and were floated to the next span to be poured.

### CONCRETING PLANT

Sand and gravel for the concreting operations were furnished by the Arundel Corp. from its pits at Northeast, Md., on Sanford & Brooks' barges, of 500-ton capacity. These barges were usually unloaded by a McMyler-Interstate steam crawler crane mounted on cribbing at one end of the concreting barge but when a large pour was being made in the morning so as to permit finishing of the deck before dark, an extra derrick barge was put in between the gravel barge and the concreting barge to release the other crane for handling the concrete bucket alone. The cement was delivered by schooner from Baltimore and unloaded to the contractor's own storage barge at the site.

The concreting plant consisted of a three-compartment Blaw-Knox bin and batchers of which only two were used, mounted directly over a Ransome 29-cubic foot mixer. The batch which was given a full one-minute mix consisted of 1,175 pounds of sand, 1,520 pounds of gravel and five bags of Lehigh cement in cloth bags. The allowance for moisture was 5 per cent for the sand and 1 per cent for the gravel. The concrete crew consisted of one mixer man, one man emptying the cement into the mixer hopper, one man on the gravel bucket, and one man controlling the water and dumping the mixer, and a foreman. The mixer was equipped with a water gage and a batch meter.

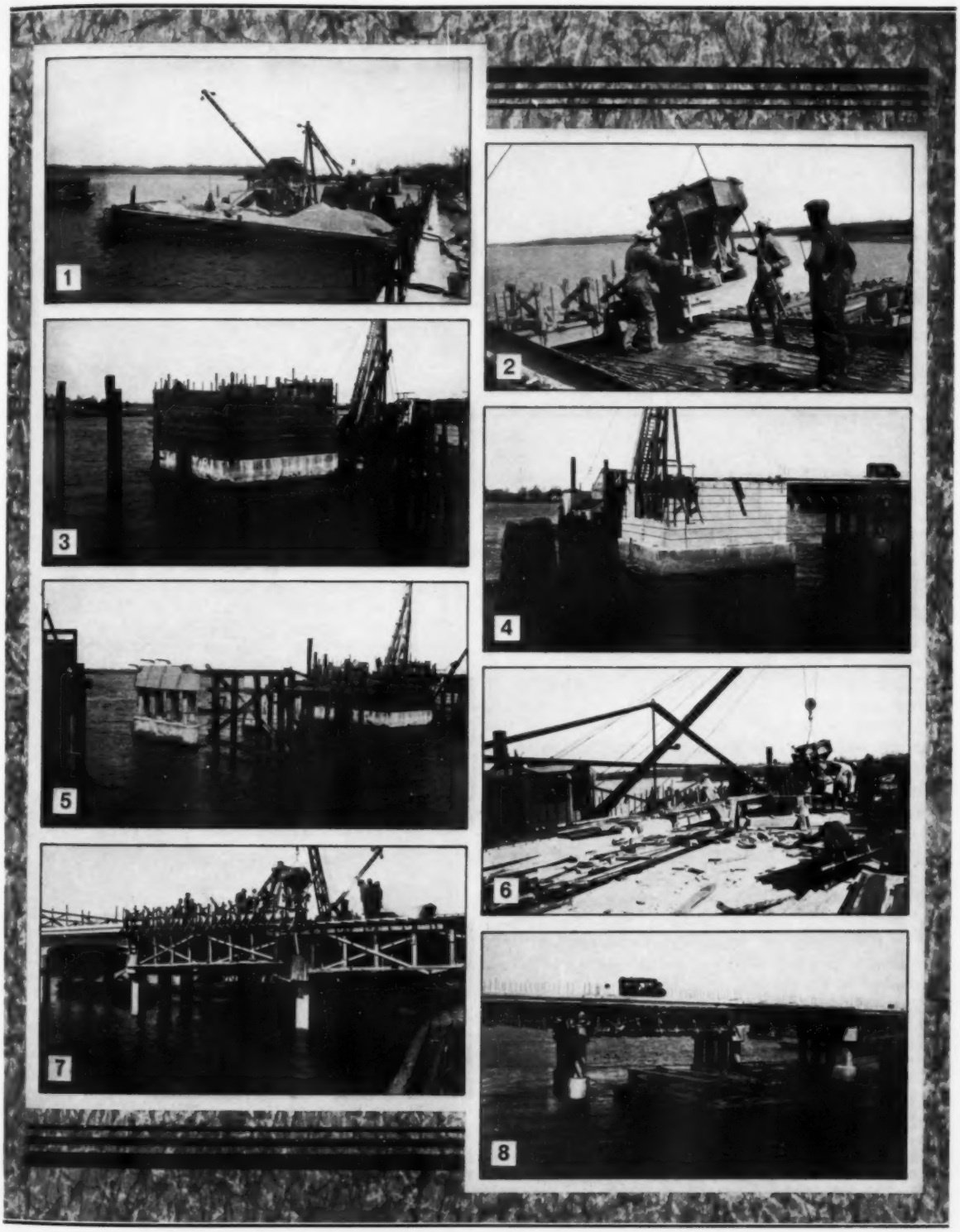
The concrete bucket with a side discharge was swung from the concrete barge to the deck of the bridge by the steam crane and the concrete placed by five men using a chute made of the top section of an old dredge pipe with the worn invert cut out with a cutting blow pipe. A short wooden chute was also used for pouring the beams. The chutes were set up on horses and the concrete was all spaded and hand tamped. For finishing the concrete a screed made of a 7-inch channel 37 feet long was used. To maintain the alignment of the screed a truss of 4-inch channels was built with adjustable 1-inch tie rods which could be locked when in the proper position. It required four men to use this heavy screed.

When the concrete was not too old the finishing was done by hand with wet carborundum bricks, but when the concrete was hard the finishing was done with I-R pneumatic finishing machines, the air being furnished by a Sullivan portable compressor set out on the deck of the bridge by one of the derrick barges. One of the most interesting and practical schemes on the bridge was the hanging scaffold for the finishers working on the outer beams of the deck. The scaffolds were suspended from a frame running on four wooden wheels on the slab. Thus at least four carpenters were released for other work who would have been required for building, moving and tearing down scaffolding for each panel. This frame was laughed at by some members of the organization when it was first seen but it has now been used on three bridges, with slight alterations for variations in the width of the roadway, and has earned its salt many times over. The 3-foot wooden wheels are built up of three layers of ¾-inch boards crossed at 60 degrees. The job was equipped with Oxweld Acetylene Co. carbic lights for use when finishing operations were carried on after dark.

A distinct novelty, which it is understood is patented, was used for the spacing of the pilasters in the hand-rail. Three blocks each slightly wedge-shaped were placed in the forms so that the whole hand-rail could be poured at one time. When the forms were being stripped all that was necessary was to knock out the center wedge and the set of three were immediately released. One set of these wedges is shown in one of the illustrations.

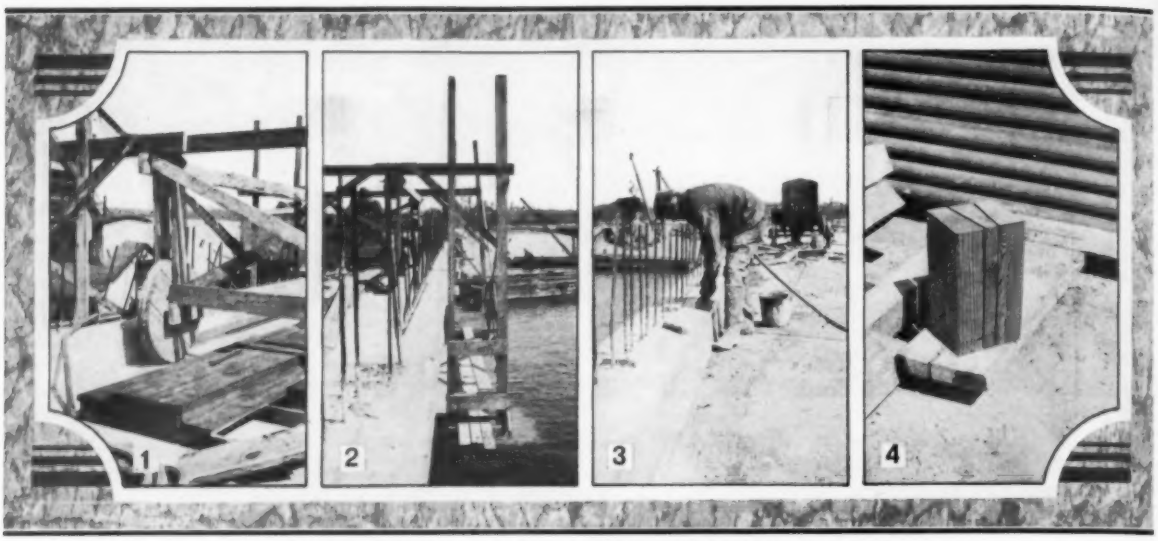
### A VERSATILE TANK

A 100,000-gallon steel tank mounted on a frame was used in the early stages of the work for testing the piles which were required to hold 90 tons with a maximum settlement of ¼ inch. The tank, when filled with water to a depth of 15 feet, weighed 93 tons with the tank and frame. After the tests had showed that the piles were entirely satisfactory the tank was moved over to the shore and used as a storage tank for the




*FORM WORK AND CONCRETING ON THE BOHEMIA RIVER BRIDGE*

1. *The floating concreting plant.* 2. *Swinging in the funnel-shaped concrete bucket with side discharge.* 3. *The forms completed for the walls of one of the piers.* 4. *A pier with the wall forms stripped.* 5. *The cap poured on one of the bents composed of four pre-cast concrete piles.* 6. *In the foreground is shown the 37-foot screed made of a 7-inch channel and a truss of 4-inch channels.* 7. *Pouring one of the decks and integral curb.* 8. *Forms for the deck in place on the left-hand span, and stripped on the right-hand span. The barge for dropping the forms is shown in the foreground.*




*SOME INTERESTING DETAILS OF THE CONCRETE WORK*

*1. One of the rollers of the hanging scaffold for finishers working on the outside of the deck beams. 2. The hanging scaffold. 3. Machine-finishing the curb. 4. An assembly of the three wedge-shaped blocks used in pouring the pilasters in the hand-rail.*

water supply for the various pieces of steam equipment. A well was driven in the hillside above the material yard and offices and a flowing well created which kept the tank well-filled.

PERSONNEL

The contract for the Bohemia River Bridge called for the completion of the work by the contractor in 200 working days. Sanford & Brooks Co. of Baltimore, Md., whose work is described above, completed the structure well within the contract time. Captain M. F. Watts was Superintendent for the contractor and B. W. LeSueur was Resident Engineer for the State Roads Commission of Maryland.

## A $75,000,000 Loan to the Port of New York Authority

THE R.F.C. has approved a loan of $75,000,000 to construct a mid-town tunnel under the Hudson River from 38th Street in New York City to Weehawken, N. J. A compromise in the usual interest rate charged by the R.F.C. was reached at 4½ per cent. This gigantic project will employ 200 engineers and 3,600 other workers for a period of about six years.

## The 1932 Proceedings of the American Society for Testing Materials

AS is customary, the 1932 Proceedings of the American Society for Testing Materials, which recently has been announced, is published in two parts. Part I includes the annual reports of the many Society committees and the technical papers and standards, the annual address of the President and the report of the Executive Committee. Part II contains the many technical papers presented at the annual meeting and the discussions of these papers. By including the extensive oral and written discussions, there is retained in permanent form the views of many technologists on the subjects up for discussion. Each part of the Proceedings is available from the American Society for Testing Materials, 1315 Spruce St., Philadelphia, Penna., at the following prices: paper binding, $5.50; cloth, $6.00 and half-leather, $7.00.

## Installing a 250-Foot Culvert Through a Levee

THE U. S. Engineers of the Memphis District recently placed a 250-foot culvert through the main levee at Moons Landing, Miss. This Toncan culvert is 250 feet in length, made of 10-gage metal, and 42 inches in diameter. The crown of the levee is 35 feet above the invert of the pipe with a sluice gate at the discharge river end of the culvert. The Tri-State Culvert Mfg. Co., Memphis, Tenn., fabricated this culvert which was installed by Mike Harvey, Contractor of Sardis, Miss., under the direction of L. K. Hill, Resident Engineer for the U. S. Engineers.

*A View of the 250-Foot Culvert through the Main Levee at Moons Landing, Miss.*

# A Steel Pile *and* Concrete Breakwater Wall *at* Key West, Fla.

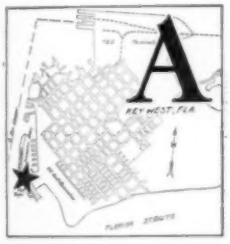
By

B. Benson

*Resident Superintendent*

*Van Gordon Construction Corp.*

*Jacksonville, Fla.*

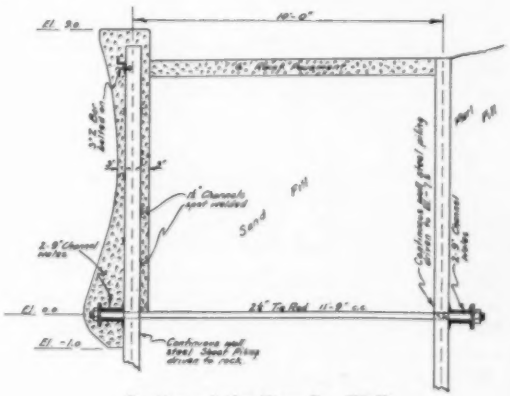



AT the Key West, Fla., Naval Station, a recently completed steel and concrete bulkhead replaces an old timber bulkhead as the seaward retaining wall of the earth fill breakwater enclosing the submarine basin. Plans for this improvement were drawn up by the Bureau of Yards and Docks, U. S. Navy Dept. The construction was done by the Van Gordon Construction Co. of Jacksonville and Miami, Fla. The wall was designed as a cantilever with concrete encasing the upper portion of the steel piling above the tie rods. At its outer edge the breakwater is located within a hundred yards of the main ship channel which has a depth of 28 feet. As the tidal currents are very strong, cellular groins were constructed at regular intervals along the wall, not only to prevent scouring but if possible to build up the bottom in front of the wall. For structural security the two continuous lines of steel piles were designed to stand as a unit, should a section of the bottom be washed away from in front of the wall. The outer row of steel piling was driven to rock, making an effectual cut-off wall.

The breakwater had originally been constructed as a dredged fill, its outer edge protected by a timber sheet pile bulkhead and its inner side retained by timber sheet piles against a timber wharf. Action of the teredo and the seasonal "nor'westers" shortened the life of the timber bulkhead. At the time the new construction was started the old timber bulkhead along the outer edge of the breakwater was fast going to pieces, causing serious loss of the fill by erosion. The extreme end of the breakwater was formed by a crib of 12 x 12 timbers 40 x 200 feet, built and sunk in place and filled with earth by dredging. This crib, too, had suffered from the weather and the teredo, and the plans called for enclosing it with a line of steel piling driven to rock.

## Handling Materials

There being a depth of 22 feet at low tide within the basin, it was possible to take advantage of water delivery for the steel piling and concrete aggregates, utilizing the wharf along the inside of the breakwater to dock ocean-going freighters. In this manner two shipments of steel piling and accessories, amounting to 1,800 tons, were delivered right on the job site, as was one cargo of sand and gravel amounting to 3,600 tons.




*Section of the New Sea Wall*

The steel piles were stacked up along the wharf for the full length of the job, within easy reach of the crane working on the outer side of the breakwater. Due to the restricted width of the breakwater it was necessary to build a bin to receive the concrete aggregates. The sides of the bin were 5 feet high and the floor was 45 feet x 180 feet, divided by partitions into three sections for two sizes of gravel and one of sand. It was possible by shifting the ship along the wharf to unload the aggregates from the ship's hold to the bin with one handling.

### Driving the Sheet Piling

The equipment used to set the steel piling consisted of a Link-Belt 1-yard crane, a McKiernan-Terry No. 7 steam hammer, a drop hammer with swinging leads, a 6-inch steam pump for use with a 2½-inch water jet, and a 60-hp horizontal boiler mounted on wheels. The boiler supplied steam for the pump and the hammer. Upper and lower guide wales for both lines of steel were supported on two lines of temporary wood piles. These temporary piles and wales were pulled and set ahead by a small extra crew working from 3 to 5 hours daily after the regular 8-hour pile-driving crew had knocked off.

One 8-hour pile-driving crew handled the setting and driving of the steel piles. In starting, the pile crew would jet down as far as possible as many piles as they estimated they would be able to drive to grade that day. The dredged fill was a mixture of sand and broken rock taken from the submarine basin and it was not possible to get more than half the necessary penetration of the piles by using the jet. As rapidly as the piles were set in with the jet they were made fast to the falsework with temporary guys of light chains with grab hooks and turnbuckles. When a sufficient number of piles had been set in this manner the jet was laid aside and driving with the steam hammer started. The steam hammer was equipped with a set of extension legs lined with iron and arranged to fit snugly against both faces of the piles. Two piles were driven at one time. In handling the hammer one line from the crane was used to pick up the hammer and the other line was passed through the fairleads to a bridle on the extension legs. While driving, a light brake was kept on the hammer line to steady the top of the hammer and the line to the bridle on the extension legs was kept tight to hold the piles tightly against the guide wales as they were driven. The extension legs kept the hammer straight and centered on the piles. At the location of the tie rods, two piles were left about 2 feet above grade so that it was possible to burn the tie rod holes out of water and to an exact grade which was determined by the penetration of the adjacent pile. As soon as these piles were burned the tie rod piles were driven to grade with the next driving.

The same general method was used in driving the groins except that the groins were not set until after the concrete wall had been poured and backfilled, enabling the crane to walk within reach of the groin ends. Some of the groin piles of special section were driven with the drop hammer as they would not fit the extension legs of the steam hammer. In each groin the complete set of steel piles were jetted in and the closure made before any driving was done. The pile-driving crew drove 4,500 piles with an average of over 40 per day and a maximum of 120 in one day. By using special care in setting the piles and holding them while being driven it was possible to complete the job without using any taper piles or having to reset any due to the piles getting out of plumb.

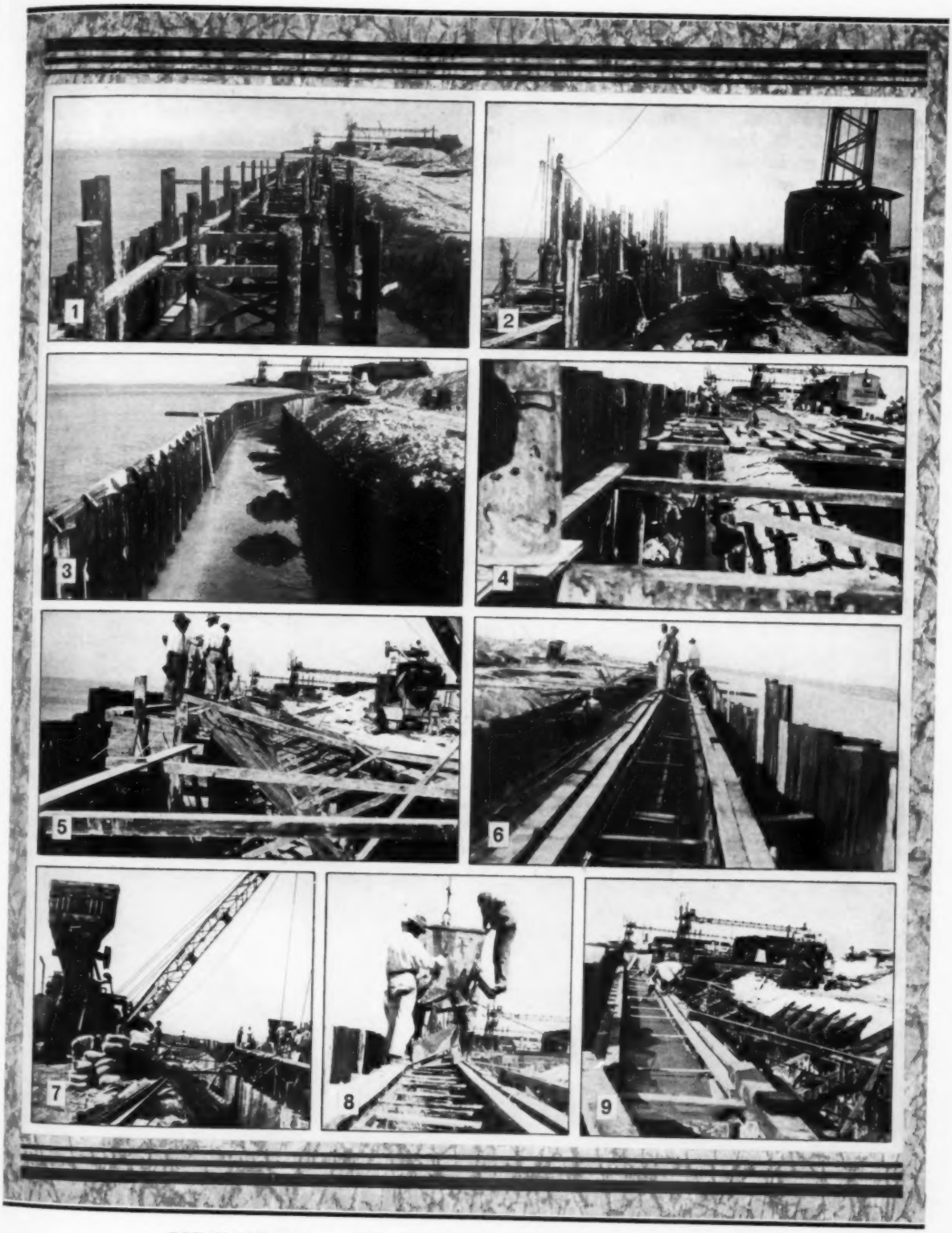
### Cofferdam to Protect Concreting of Bulkhead

Specifications required that the concrete of the bulkhead be protected from sea water for 10 days after it was poured. It was necessary to provide a cofferdam of sufficient length to protect two weeks of concreting or approximately 600 feet of wall and also to provide for a maximum head of 6 feet above the bottom of the excavation. As the work was in progress during the season when frequent "nor'westers" were to be expected, creating a heavy sea along the exposed side of the breakwater, it was also necessary to provide special protection for the wall. To furnish this protection the groin piles were set temporarily as a continuous cofferdam about 3 feet outside the line of the concrete wall. In this way it was possible to put in earth dams between the temporary cofferdam and the permanent line of steel piles ahead, and between the concrete wall and the cofferdam behind. The cofferdam piles were pulled and set ahead as soon as the concrete was 10 days old. The groin piles were set about six times as cofferdam piles but due to the small penetration required for these piles, demanding only light driving, they were in no way injured for their final use in the groins.

### Formwork and Concreting

The equipment used in the concreting work consisted of the Link-Belt 1-yard crane, a Rex 27-E paver, a 1-yard bottom dump concrete bucket, two 8-inch centrifugal pumps, one 6-inch and one 4-inch centrifugal pump, two double 4-inch diaphragm pumps, and one woodworking machine in the carpenter shop. The crane was kept busy pulling and setting cofferdam piles, stripping and setting forms, moving pumps, and placing concrete in the forms with the bottom dump bucket. The forms were made up in 10-foot sections and the ends bolted together in place. About 300 feet of forms were used, permitting a 100-foot pour three times a week. The front and back forms were bolted together across the top above concrete grade. The lower part of the front form was braced against the cofferdam piling and the lower part of the back form was braced against the back row of permanent steel piles. Alignment was secured and maintained by the means of tie-back cables to the back line of permanent steel piles. These tie-back cables were spaced every 5 feet and were adjustable with a turnbuckle, permitting the form to be pulled into line with a tie cable or pushed out with a wedged brace.

All concrete was mixed by the paver and placed in the forms by the crane using the bottom dump bucket. The crane and the mixer both operated on crawlers, making it possible to move the mixing plant as the concreting progressed without any interruptions or lost time. The mixer was supplied by three one-batch trucks batched at the storage bins. One condition seldom encountered elsewhere was a lack of a convenient supply of fresh water for concreting. Wells driven on the island of Key West have never located other than salt




*DETAILS IN THE CONSTRUCTION OF THE KEY WEST BREAKWATER*

*1. The guide wale system showing the piles left up for burning the tie rod holes. 2. Setting steel piles with a jet. 3. Two lines of steel after the falsework was pulled. 4. Setting bottom forms inside the cofferdam. 5. The form bracing and alignment system. 6. Setting forms. 7. Pouring the concrete. 8. The concrete bucket used in encasing the piles with concrete. 9. Finishing the freshly poured wall. In the background is seen the wall covered with burlap which was kept wet with fresh water for ten days.*

or brackish water. The city depends entirely on rain water for its fresh water supply, each building having its own cistern and pumping system. It was necessary to purchase rain water from a local concern owning several large warehouses with facilities for catching and storing the rains from the roofs of these buildings. This water had to be hauled 2 miles in a tank truck to a 1,000-gallon storage tank with a small power pump set on a timber sled. The sled was pulled ahead by a tractor as the concreting progressed, one set-up being sufficient for two pourings.

### BACKFILL WITH SAND AND MARL

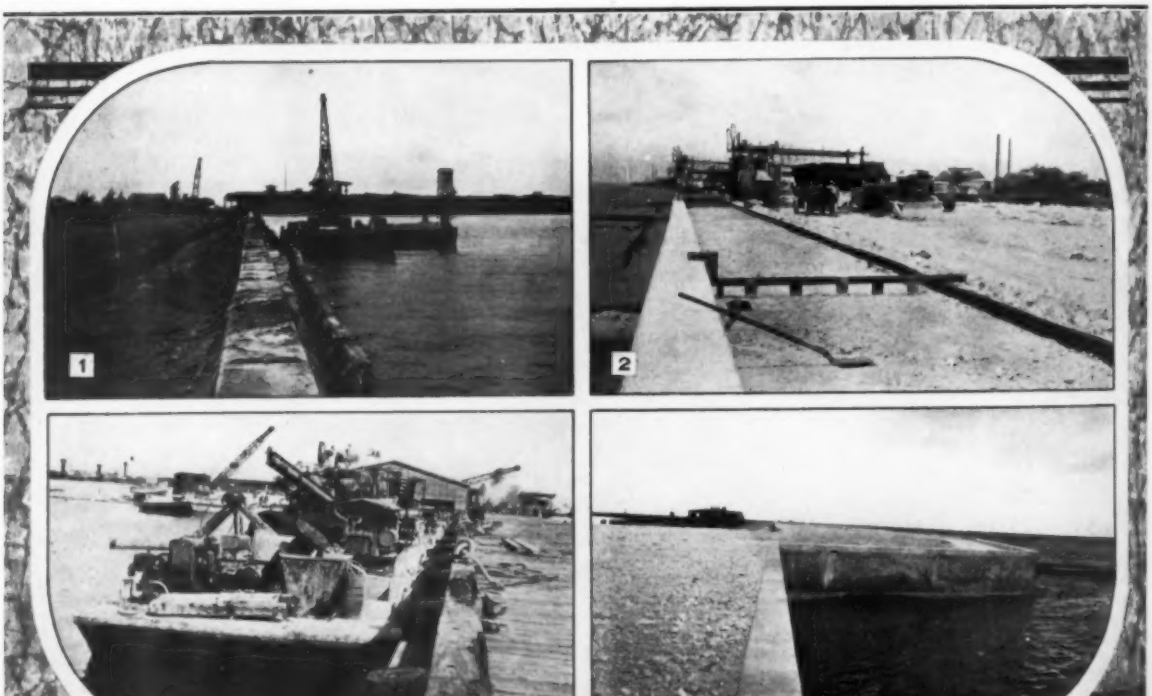
The space between the forward bulkhead and the back line of steel piles was filled with sand obtained from a dredged spoil bank about 1½ miles distant across the harbor. The portion of the breakwater behind the back line of steel was brought to grade with a white marl that is peculiar to the Florida Keys. This marl is found covered by shallow waters and when first loaded onto barges has the consistency of stiff mud. When it is spread and exposed to the wind and sun it draws together into hard impervious segments leaving a checkered surface with deep cracks. The material as a whole is very dense and resistant to erosion. The marl was brought from a deposit about 3 miles north of the job across the harbor. The equipment used in placing the two classes of fills consisted of two ¾-yard cranes working from barges, one to load and one to unload, four deck barges with sideboards, and one tug.

The fill between the concrete bulkhead and the back line of steel piles was thoroughly compacted by jetting, using the 6-inch steam pump delivering through a 2½-line and a 1½-inch jet pipe developing over 80 pounds pressure at the jet. The jetting was done after regular working hours by two men and progressed as the pump was moved ahead for driving the groin piles. After this area was thoroughly jetted it was capped with a 10-foot pavement 6 inches thick. The 3,000 square yards of paving was handled in five pours, walking the paver just outside the back form and dumping directly in place from the paver bucket. The cellular groins, after being filled in, were capped with a similar 6-inch pavement. The concrete for the groin pavement was placed with the bottom dump bucket handled by the crane in the same manner that the concrete was placed in the bulkhead.

On completion of the job all of the equipment was loaded on barges and towed to the Van Gorden Construction Co. yards in Miami, at a considerable saving over freight rates.

### PERSONNEL

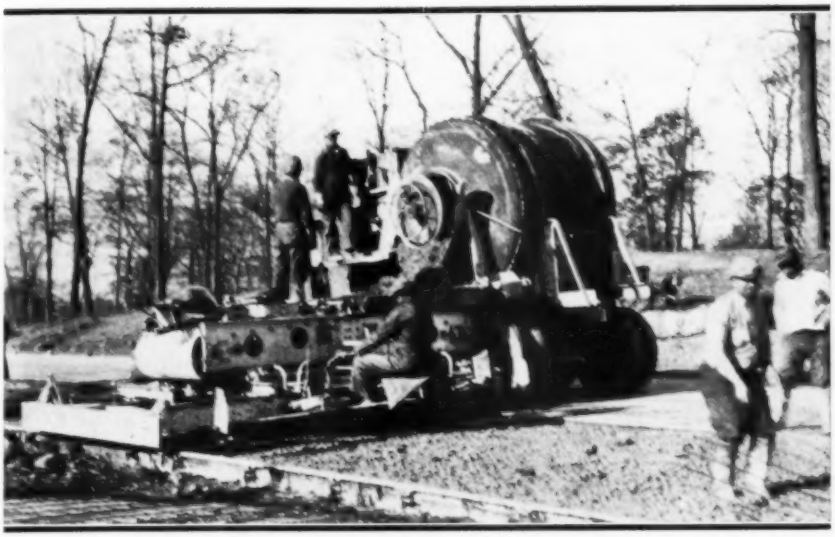
Lieut. W. T. Eckberg, Public Works Officer, 7th Naval District, was Engineer in charge for the Navy Department with G. W. Thaxter as civilian assistant. For the contractor R. L. Parham of Miami was General Superintendent, with the author as Resident Superintendent. Active work was started on December 8, 1931, and completed June 8, 1932.




*COMPLETING THE FILL AND PAVING OF THE BREAKWATER*

*1. Placing fill. 2. Pouring the sidewalk pavement. Note the tops of the back line steel piles against the pavement forms. 3. The job complete, showing the equipment loaded out. 4. The finished job, showing the upper part of the old timber wall removed.*

# Truck Mixers Pave 7.35 Miles



## *B. Perini & Sons Built Novel Batcher Set-Up and Handled 1,000 Cubic Yards of Concrete per 10-Hour Day*

GRAND CENTRAL PARKWAY is a new thoroughfare, with all grade crossings eliminated, which is being built by the New York State Department of Public Works on Long Island. It connects at the westerly end with Queens Boulevard leading to the Queensboro Bridge across the East River into the heart of New York City. This new thoroughfare consists of a through way with adjacent service roads which give access to the cross roads. The main roadway is being built with two 10-foot and two 12-foot strips of concrete and the service roads of two 10-foot strips of concrete; thus the contract to be described, while nominally only 7.35 miles in length, represents the equivalent of about 30 miles of 20-foot pavement.

### Contract Award and Start of Work

The contract for this reinforced concrete pavement, Sections 1A, 2A, 3B, 4B, 5B, 6B and approaches, was awarded on September 1, 1932, to B. Perini & Sons, Framingham, Mass., with the stipulation that work, with the exception of seeding, must be completed by January 1, 1933. The total bid price was $975,970.00.

The rough grade on this job was done under other contracts the previous year and the grade was left about 8 inches high in the center because it was expected that the paving job would not be let for two years. This made it necessary for the contractor to do some rough grading, on which he used five Lorain 75-B shovels and four Warco one-man power graders. Three of the graders were used well ahead of the form setting and one to finally trim the grade just ahead of the form setting crew. The hand labor on grading consisted of two gangs of eight men and a foreman each.

### Form Setting and Fine Grade

Both 8-inch and 9-inch slab was required on this job, the thinner slabs for through traffic and the heavier slabs for the service roads. The contractor purchased 20,000 feet of new Blaw-Knox forms, 10,000 feet of each height. There were two form setting gangs, each composed of a foreman and four form setters. These were followed up by the fine grading crew consisting of a foreman and six men, working between the forms. The fine grade was rolled with a 5-ton Fordson roller and tested frequently with hand scratch-boards. The forms were kept between 1,500 and 2,000 feet ahead of pouring the slabs. Two men were used on each side to tamp the forms to a firm foundation because of the weight of the concrete spreader which ran on the forms and the two finishing machines which followed it.

Premoulded Elastite expansion joints ¾-inch thick were set every 78½ feet with equal leg caps which ran down 5½ inches on each side of the expansion joint

material. The top was set at the level of the reinforcing fabric to permit the spreader to run over them. The joints were staked with three pins on the far side and two pins on the side toward the paver. The stakes were pulled just ahead of the finishing machines by men with tongs. The expansion joints were punched and the caps slotted for the insertion of five ¾-inch dowels, 1½ feet long, set with a long chair on the side away from pouring and a metal sleeve on the near side. Two men handled the setting of expansion joints and the oiling of the forms and two others placed the steel. Double reinforcing was placed for 5 feet either side of each expansion joint. After the cured slab was cleaned, the top 2½ inches of the expansion joints were poured with Genasco block and joint filler by two men using a portable Aeroil asphalt kettle which was pulled over the slab. Three of these kettles were in use on the job.

### AGGREGATES AND BATCHING

The contractor used two batching plant set-ups on the job, one about ¾-mile from the western end and the other about a mile from the eastern end of the contract. The two set-ups were practically identical, being built close to a hill so that a heavy ramp could be built from the top of the hill to the top of the batching plants, permitting truck delivery of all aggregates and cement direct to the top of the bin. The wood ramp was built up of 12 x 12 posts with heavy sway braces and a top of 3 x 12 lumber. A 12 x 12 back stop at the edge of the bin permitted the trucks to back up to the bin where they were blocked and then dumped. The Butler 3-compartment bin was arranged with the sand in the center section and the ¾-inch stone to the right and the 1½-inch stone to the left. The Butler bulk cement plant was set up at the left of the aggregate bin with a space between for handling the special cement.

A cement shed capable of storing about 500 bags of cement was used for the special Velroca high-early-strength-cement. When this was used it was dumped in a hopper above a spiral steel pipe chute which delivered it to the trucks about 30 feet below. A separate runway on the far side of the cement storage shed was used by the cement trucks delivering the bulk cement to the top of the cement batching plant.

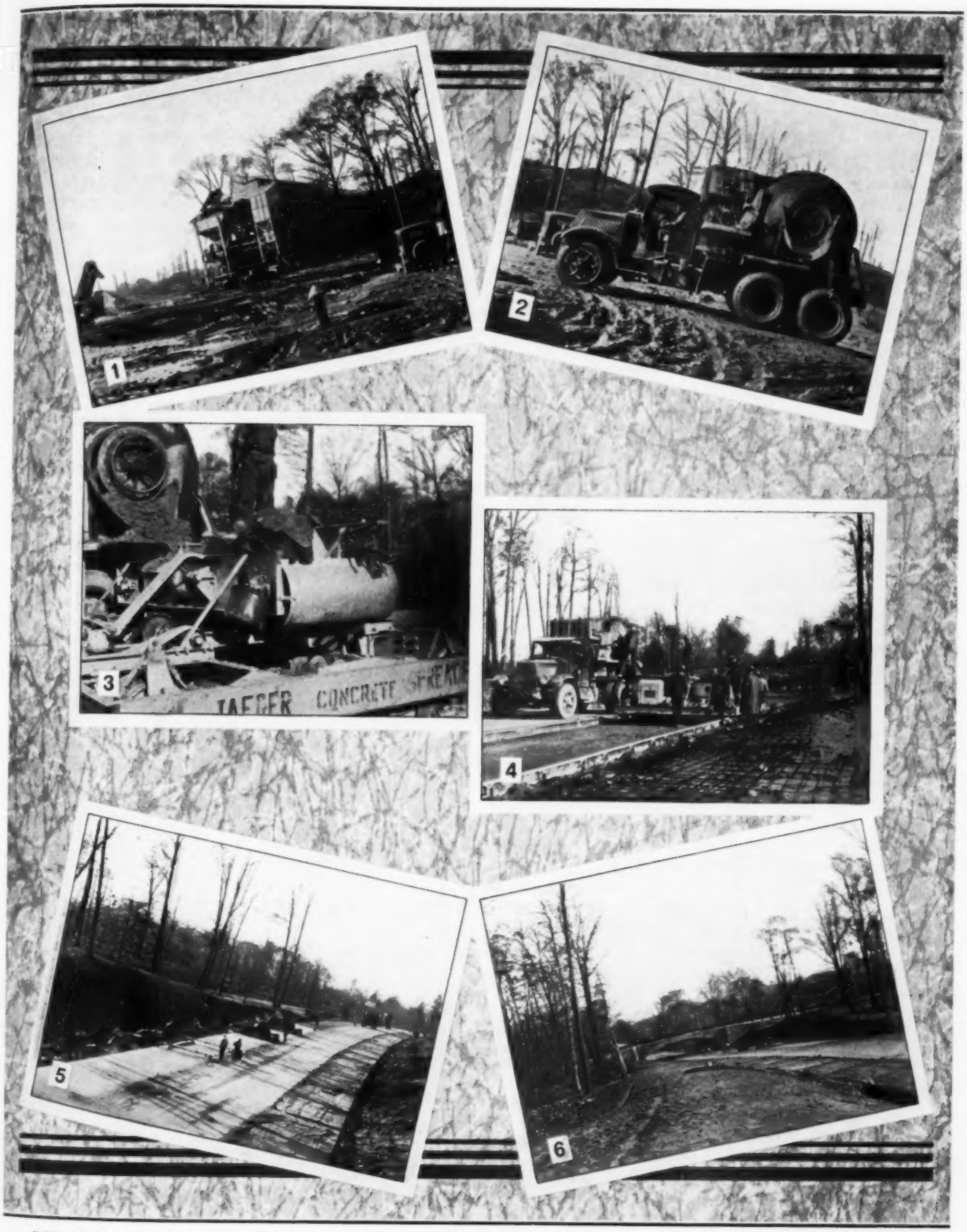
All aggregate was hauled 3 miles from a dock at Flushing, N. Y., by E. B. Simpson, a subcontractor of Flushing. The New York Trap Rock Co. delivered Hudson River dolomite by barge to Flushing. The Seaboard Sand & Gravel Co. of Port Jefferson, Long Island, similarly delivered the sand by barge at Flushing. The Penn-Dixie standard cement was delivered by barge to Flushing and thence unloaded into the trucks which hauled it to the batching plant. In a flat area below the batching plant a large stockpile of both sizes of stone and of sand was maintained against any failure of delivery. A Haiss loader was used at the stockpile for rehandling the aggregate to trucks which ran up around the hill and onto the ramp, dumping at the top of the bin. This eliminated the use of a crane or shovel at the plant. One man at the top of the bin received all the stone and sand and cement for the contractor, checking the loads as they arrived. In addition, the hauling subcontractor maintained a man at the batching plant to keep track of his trucks.

A single batch for the 5-yard Jaeger truck mixers consisted of 7,094 pounds of sand, 5,819 pounds of coarse stone, 5,371 pounds of fine stone and 3,196 pounds, or the equivalent of 34 bags, of cement. The batch with the trucks weighed 20 tons which created somewhat of a problem in the maintenance of the roadways, particularly before any slab was opened for traffic. When operating on newly completed pavement, the batch was reduced to 3 yards. At the batcher plant one man weighed all of the materials and handled the water while on the bulk cement plant another man weighed out the cement batches. This plant was equipped with a cylinder valve to prevent overflow of the cement. The water for the batching plant was taken through a 2-inch Thomson meter from a nearby hydrant. In order to assist the State Highway Department in checking the batches, because of the unusually large weight, a 3,171-pound test weight of concrete was cast in an iron cylinder. To check the batches it was hooked on and raised with a chain falls and the scales balanced, then the weight was removed and the batcher filled with material until the scales again balanced, after which the weight was hooked on a second time to check their accuracy for double the test weight. The bulk cement plant was electrically equipped throughout to speed operations and to insure accuracy.

This crew, with one man who opened up the top of the truck mixers as they arrived at the plant and a foreman, handled 200 loads of 5 yards each per 10-hour day. The contractor's interest in the safety of his men was evidenced by a genuinely safe ladder from the ground to a heavy platform which ran all around the batching plant and connected the batching plant with the cement batcher. The ladder was built of 2 x 4's with heavy flat rungs reinforced by 2 x 1 stock nailed on the face of the ladder between each rung. Further, the top of the ladder was set in a notch in an extended plank on the platform so that it could not be pulled away from the platform. The left upright of the ladder was continued about 4 feet above the top rung and proved handy for the men to catch hold of both in climbing up the ladder and in starting down.

### THE TRUCK MIXER FLEET

A fleet of twelve 5-yard Jaeger truck mixers mounted on Mack trucks with dual rear axles, giving ten wheels equipped with 40 x 8 and 42 x 9 Goodyear or General tires, and weighing with their load 20 tons each, mixed the individual batches while running from the batching plant to the point of pouring. The Jaeger 5-yard side discharge truck mixers were equipped with a water measuring tank accurate within ½ per cent and holding in addition to the 125 gallons for the mix, a supplementary 40 gallons for washing out the truck every third trip. To deliver the concrete between the forms the truck mixers were driven either along a previously poured strip of concrete or on the fine grade adjacent to the strip being poured. One man climbed on the truck at the point of delivery, spinning the hand wheel to open the side discharge which delivered the concrete onto the belt feed of the Jaeger concrete spreader which was operated by one man sitting at the back of the machine. This machine traveled forward and back under its own power at a speed of from 8 to 30 feet




*DETAILS OF CONCRETE HANDLING ON THE B. PERINI & SONS CONTRACT ON THE GRAND CENTRAL PARKWAY, LONG ISLAND, N. Y.*

*1. The batching plant set-up showing the wagon loader at the stockpile, a truck delivering ¾-inch stone to the aggregate bins and at the right, the bulk cement batching plant. 2. One of the twelve 5-yard truck mixers equipped with dual rear axles and ten pneumatic tires. 3. The side-discharge truck mixer delivering concrete to the belt hopper of the spreader. Note the shovels stacked on the spreader for use in case of emergency. 4. Reinforcing steel spread along the shoulder ready for placing 2½ inches below the top of the slab. 5. The two finishing machines and longitudinal float running on the left-hand slab and burlap spread on the right-hand slab. 6. A typical scene on the job showing one of the flat-arch stone-faced bridges. Photographs by Harry Grand, Resident Engineer.*

*Left to Right, A. D. Greenman, Construction Engineer, and Harry Grand, Resident Engineer, for the New York State Department of Public Works, and J. L. Doherty, Superintendent for the Contractor*

per minute. The belt delivery of concrete carried the material to the center where it dropped over a gate delivering it either to the left or right hand side of the two-way screw which spread it over the prepared fine grade. The speed of the spreader screw was synchronized with the forward traction of the spreader to give uniform depth of the concrete. The spreader screws were lowered to give two-course spreading. The first course was spread to a depth of 2½ inches below the top of the forms and then the Wickwire Spencer reinforcing fabric was placed. The machine then backed up and made another trip over the same area, spreading the top course. The spreader was equipped with single-flanged wheels for operation on two forms and later was equipped with double-flanged wheels to run on one form and flat wheels to operate on the completed slab. At points where expansion joints had been inserted in the completed slab, short steel plates were laid over the joints to permit the flat wheels to run across without damaging the slab at the corners.

The truck mixers required about 3½ minutes to load at the batching plant and about 4 minutes to unload their 5-yard batches on the road. At this pace it was possible for the fleet of eight truck mixers to average about 4,000 feet of 10-foot slab per day.

## FINISHING

The concrete spreader was immediately followed by two spaders who worked along the side of the slab and then two Ord finishers kept pace by machine-finishing the slab. The finisher operators did their own shoveling to the strike-offs of the machines, producing a uniform surface on the 9-inch slab. Two hand finishers used long-handled floats and "sleeve boards" to iron out any irregularities, two men did all the edging, one handled the fiber broom for the finish and two men placed the burlap immediately behind the brooming. A crew of six laborers cleaned the concrete from the forms and any which was left on the slab by the finishing machine. A Carr twin rolling bridge was used by the longitudinal float men and other hand bridges were scattered back of the finishing machine for the use of the hand finishers.

## CURING

Because of the speed of operation in pouring 4,000 feet a day it was not considered wise to have men sprinkling the burlap, so sprinkler trucks were built with 500 to 700-gallon tanks mounted on them which loaded at the hydrants and drove down the grade adjacent to the new slab four or more times daily as needed and sprinkled the burlap with a bar which was swung out over the slab. The 3-tank trucks, each of which was equipped with a 2-inch spray bar, were also used to sprinkle the hay which was used for the final curing on a section of the job. Two were usually kept on hay and one sprinkling the grade ahead of pouring. One of these trucks was equipped with an outboard motor pump so that at the end of the day it could go out and wash down the equipment, particularly the concrete spreader which of necessity remained on the forms.

The contract required that at least 1,800 feet of this job must be cured with hay and water for experimental purposes as a comparison between the effectiveness of asphalt curing and hay curing. Where hay was spread


*TANK TRUCKS SPRINKLED THE GRADE AND HAY AND WASHED OUT THE TRUCK MIXERS*

*1. One of the trucks was equipped with an outboard motor and pump to wash out the truck mixers with a high pressure stream. It is shown here with the spray bar folded back against the truck. 2. The spray bar extended and sprinkling the hay for curing a slab. This same arrangement was used to sprinkle the grade as needed ahead of the concrete paver.*

the foreman and five laborers who stripped the forms also placed the hay. On the sections of the job where hay curing was not used, two coats of cut-back asphalt were sprayed, at the rate of 0.12 gallons for the first coat and 0.10 gallons for the second coat. The second application was not made until the job had been completed and hand swept from end to end. On the section where hay had been used, 0.08 gallons per square yard was sprayed. This coat of cut-back asphalt and the second coat mentioned above were applied merely as kill-glare paint rather than for curing. It was thought advisable to produce a darker surface than would ordinarily be secured with portland cement concrete.

### SPECIAL SERVICE

The contractor maintained a machine shop which included a complete Smith acetylene welding outfit with Linde oxygen and acetylene. PrestoLite glares were kept on hand for night work, particularly where the finishers were unable to complete their work before dark.

The service trucks were kept busy over the job at all times in bringing up expansion joints and caps for setting as well as handling other materials such as hay and the drums of cut-back asphalt for curing.

### QUANTITIES AND BID PRICES

| | Item | Quantity | Unit Price |
|---|---|---|---|
| 1 | Clearing and grubbing | Lump sum | $600.00 |
| 4 | Unclassified excavation | 170,000 cubic yards | 0.20 |
| 4B | Trench and culvert excavation | 20,000 cubic yards | 0.75 |
| 6 | Overhaul | 200,000 cubic yards-100 ft. | 0.00[3] |
| 7S | Trimming shoulders and slopes | Lump sum | 7,500.00 |
| 8 | Prepating fine grade | 352,100 square yards | 0.03 |
| 9 | Sewer pipe 12-inch | 200 linear feet | 1.00 |
| 10 | Underdrain 6 inch | 1,300 linear feet | 0.25 |
| 14AS | Reinforced concrete pipe 15-inch | 3,000 linear feet | 1.15 |
| 14BS | Reinforced concrete pipe 18-inch | 3,800 linear feet | 1.45 |
| 14CS | Reinforced concrete pipe 24-inch | 2,200 linear feet | 2.25 |
| 15B | Portland cement | 127,400 barrels | 1.585 |
| 15H | Special portland cement | 8,000 barrels | 2.27 |
| 20 | First class concrete 1:2:4 | 500 cubic yards | 10.00 |
| 23 | Stone masonry | 10 cubic yards | 55.00 |
| 24 | Stone masonry laid dry | 50 cubic yards | 17.00 |
| 25 | Metal reinforcing for concrete pavement | 314,800 square yards | .20 |
| 26 | Bar reinforcing for concrete pavement | 42,700 pounds | .055 |
| 28 | Bar reinforcing for structures | 14,000 pounds | .035 |
| 30 | Miscellaneous iron and steel | 325,000 pounds | .035 |
| 32A-S | Rustic timber guide rail A | 1,500 linear feet | 1.35 |
| 32B-S | Rustic timber guide rail B | 24,500 linear feet | .90 |
| 32C-S | Resetting timber guide rail | 6,000 linear feet | .50 |
| 33A-S | Resetting cable guide railing | 100 linear feet | .50 |
| 45 | Bottom course broken stone | 2,950 cubic yards | 4.50 |
| 47S | Cement concrete pavement | 72,900 cubic yards | 4.59 |
| 55-T | Top course bituminous macadam mixing method, Type S | 2,500 tons | 9.75 |
| 73A | Bituminous material T, heavy surface treatment, heavy viscosity | 30,600 gallons | 0.155 |
| 73A | Bituminous material T, heavy surface treatment, light viscosity | 18,400 gallons | 0.155 |
| 74 | Bituminous material T cold application | 24,000 gallons | 0.155 |
| 77-A | Maintenance traffic bituminous macadam | 5,700 linear feet | 0.125 |
| 77-P | Protection of traffic | Lump sum | 2,000.00 |
| 77-S | Maintenance of traffic | 95,500 linear feet | 0.01 |
| 92 | Screened gravel, L Nos. 1 and 2 | 300 cubic yards | 2.25 |
| 92-S | Screened gravel, L.M. Nos. 1 and 2 | 220 cubic yards | 2.45 |
| 97A-S | Concrete curbing, Type A Spec. | 140,000 linear feet | .37 |
| 97B-S | Concrete curbing Type B. Spec. | 750 linear feet | 0.70 |
| 97C-S | Concrete curbing Type C. Spec. | 400 linear feet | 0.50 |
| 97G-S | Concrete curbing and gutter | 35 cubic yards | 10.00 |
| 98 | Concrete gutter | 90 square yards | 1.30 |
| 102 | Catch basins and manholes | 1 each | 50.00 |
| 103S | Changing elevated manholes catch basins and drainage inlets | 300 each | 2.00 |
| 105A-S | Concrete sidewalk, 2-course | 5,500 square yards | 1.40 |
| 107 | Timber and lumber | 1,000 feet B. M. | 100.00 |
| 109 | Relaying old pipe | 400 linear feet | 0.40 |
| 110A-S | Placing top soil | 90,000 cubic yards | 0.36 |
| 110B-S | Furnishing and placing top soil | 25,000 cubic yards | 0.90 |
| 111 | Cinders, loose measure | 9,000 cubic yards | .95 |
| 112 | Seeding | 107 acres | 50.00 |
| 113 | Maintaining work performed by previous contractors | Lump sum | 1,500.00 |
| 114 | Peat moss | 10,700 bales | .90 |
| 115 | Maintaining temporary roadway | 6,500 linear feet | .05 |
| 116 | Top course, bituminous macadam, mixed-in-place method | 3,400 cubic yards | 3.15 |
| 117 | Slope paving | 250 square yards | 17.00 |
| | | | $975,970.00 |

### PERSONNEL

This contract was completed successfully by B. Perini & Sons, Framingham, Mass., under the personal direction of L. R. Perini, President with J. L. Doherty as General Superintendent. For the New York State Department of Public Works the work was done under the direction of J. J. Darcy, District Engineer and A. D. Greenman, Construction Engineer with Harris Grand as Resident Engineer in charge.

## The Nature of Structural Damage in the Long Beach Earthquake

A CAREFUL examination of the structural damage done in Long Beach and vicinity by the recent earthquake was made by W. E. Emmett, District Engineer for the American Institute of Steel Construction. According to Mr. Emmett's report, steel apparently held the record for stability. The only fallen piece of steel evident in the vast area of demolished store buildings was an I-beam that let go when the entire brick front and sides of the structure fell to the ground. Steel-framed buildings and masonry curtains showed irregular cracks and occasionally sheared off. Many steel lintels are visible due to the fact that the brick fire-wall was not properly anchored, and many store fronts are still intact below the lintel for no other reason than that the lintel held.

The Polytechnic High School in Long Beach, covering a large city block and mostly of brick construction, is a shamble. This, apparently, is not the fault of the brick but is due to poor construction. The highest structure in Long Beach, the Villa Riviera Hotel and Apartments, is of steel-framed construction. The building, an L-shaped structure, is designed for dead and live loads and 15 pounds of wind. It came through with only a few plaster cracks.

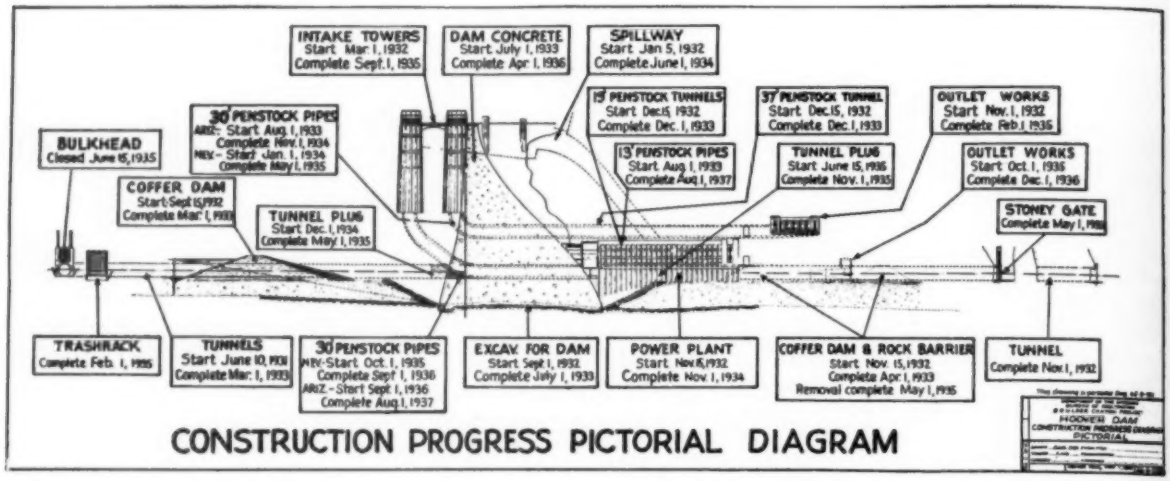
The City Hall, with a twelve-story steel frame, suffered quite a bit from failure of hollow tile filler walls, but most of these walls remained intact. The Jergens Trust Building, an eight-story steel frame with brick exterior, will have about $500 worth of plaster renewal. Apparently there was no damage to the brick exterior whatsoever and brick walls on major business and hotel buildings show very little damage. The new auditorium with steel frame, built on a big fill out into the ocean, came through practically undamaged. Many structures are still up because steel held the walls in place.

## Simplified Practice Recommendation for Wheelbarrows

THE majority of producers of wheelbarrows who have accepted simplified practice recommendation R105-32 of the Department of Commerce, Bureau of Standards, have expressed their intention to extend their present methods of identifying the simplified lines by including statements in catalogs and other trade literature. The wheelbarrow recommendation, which was proposed and developed by the industry, has been instrumental in reducing the number of styles of this commodity from 125 to 27, greatly in the interest of a better product and better service to contractors.

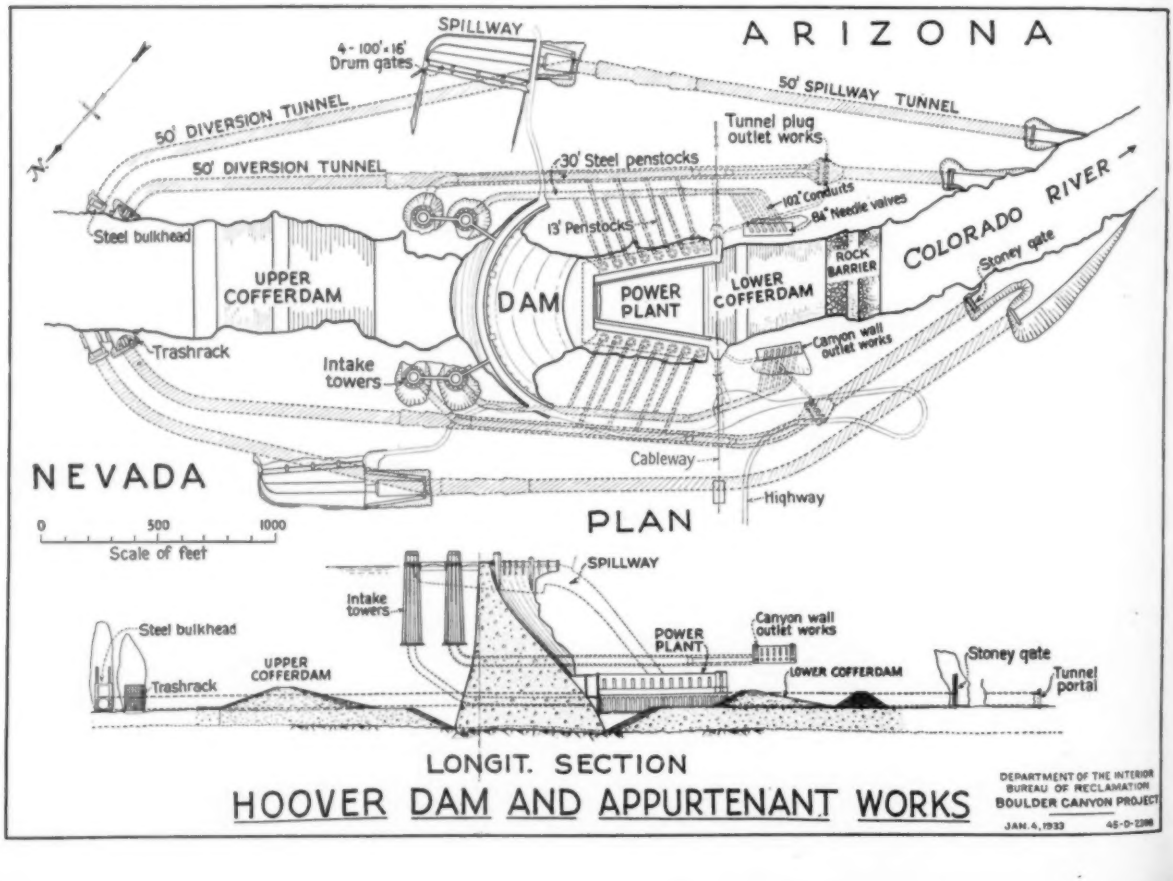
The number of national associations representing users of simplified commodities have for some time strongly urged that this policy be adopted by manufacturers who have accepted the various simplified practice recommendations. The general adoption of the identification plan should assist the wheelbarrow industry in maintaining close adherence to the waste elimination program. Cooperation by distributors, contractors and others will greatly increase the benefits and economies possible through simplified practice. When the simplified lines are so identified in trade literature their selection can be made without difficulty and much waste now incurred in checking files and auxiliary records for these data will be eliminated.

# Construction Progress at Hoover Dam




SO many inquiries have been received from contractors and laborers in various parts of the country regarding the schedule of progress at Hoover Dam that we are reproducing a pictorial diagram which was prepared by the Bureau of Reclamation to show the time when work on the various parts of the project will start and when the work will be completed. With this we are also reproducing the general plan of the project in order that our readers may orient their ideas regarding this monumental work, which will involve an expenditure of $48,890,995.

The contractor for this project is Six Companies, Inc., of San Francisco, with a field office at Boulder City, Nevada.



# Pavement Widening Operations

By

W. L. Hempelmann

*Asphalt Paving Engineer*

*A Completed Widened Section with the Forms Removed—Note the Non-Skid Character of the Pavement*

MANY state, county and municipal departments today are widening their roads and streets to provide greater safety and to take care of increased traffic. Any one familiar with road widening operations appreciates that usually the plane or line of weakness in such construction is the juncture between the old and the new base construction, irrespective of the nature of the superimposed wearing surface. Waterbound or bituminous macadam is usually widened with a similar construction. Concrete pavements have been widened with new concrete. Protection to and reinforcement of the edge of the existing slab has been attempted, at times, by undercutting the edge and attempting to fill the excavated area with new concrete, to prevent the formation of a longitudinal crack at the edge of the old pavement.

Coarse aggregate bituminous concrete lends itself very satisfactorily to use as a foundation material for widening any type of highway. One difficulty to date, however, has been to consolidate properly such base widening material due frequently to a variable width, and to the impossibility of obtaining uniform compaction of such mixture. Hand tamping has been used, but on large jobs has been found prohibitive because of cost. Where the widening was sufficient, the large wheel of a 3-wheel roller has been used to consolidate such mixture. Rolling has been found unsatisfactory at times, due to careless manipulation of the roller by the operator, and frequently has resulted in forcing the forms out of alignment, or further breaking down the edge of the old pavement.

Recently the trench tamper, mounted on crawlers, which has been used for some time for the consolidation of backfilling material has been used very effectively for tamping the bituminous macadam base material for widening existing bases. This machine is portable, the weight on the tamper can be varied, and vertical tamping is used to consolidate either the subgrade or black base foundation material. It has been found expedient to use a large metal-shod oak block somewhat higher than the forms, moved along the metal form by hand, to take the blow of the tamper when working against the form. This permits proper tamping close to the form without the danger of hitting the form and destroying the alignment. Tamping next to the old pavement is then carried on without the block, and a clever operator is able to follow the irregular old pavement outline with little trouble. The old pavement and the widened area are then covered with any suitable wearing surface material such as binder and sheet asphalt top, or asphaltic concrete.

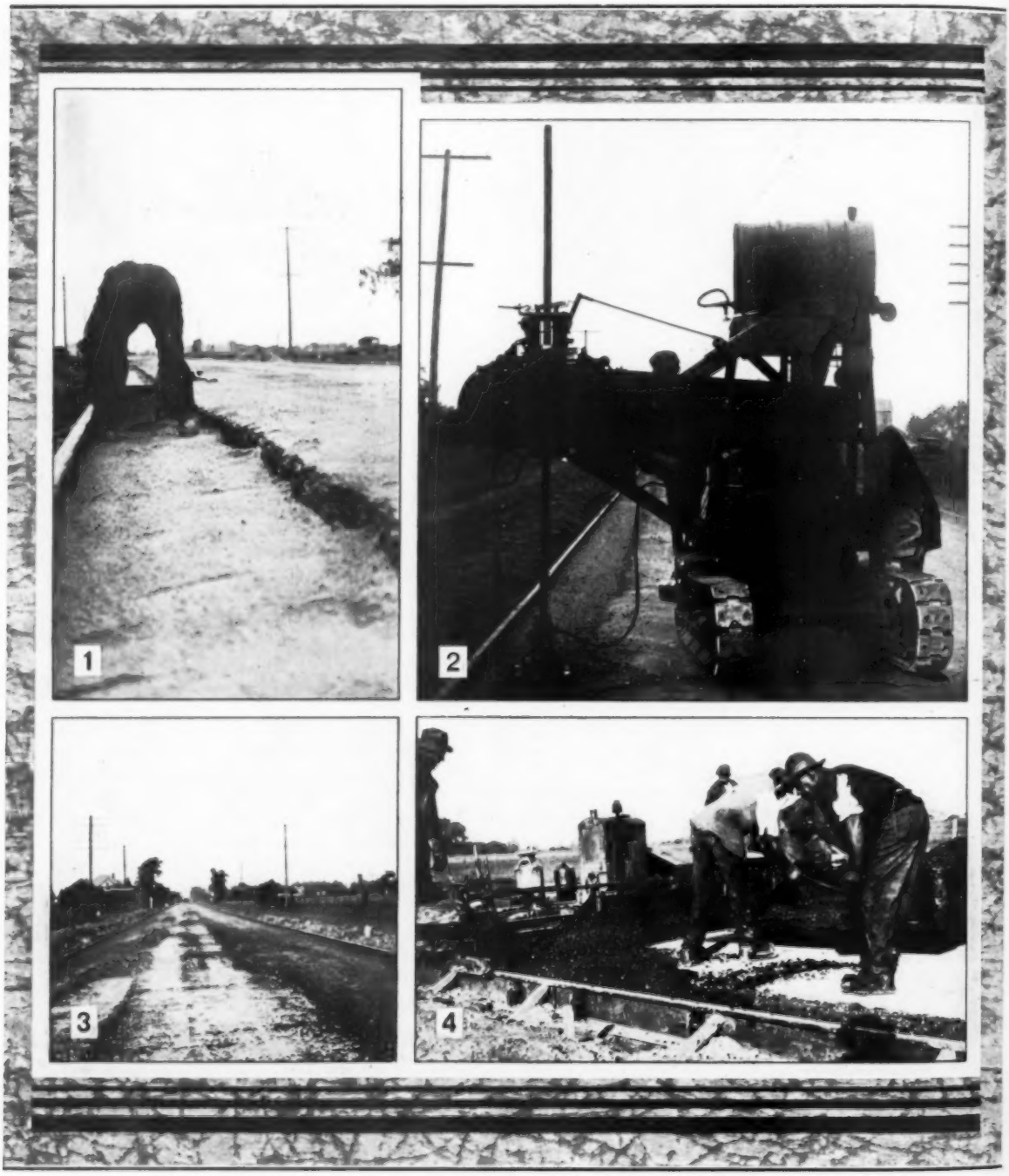
This tamping device will doubtless be used increasingly in all pavement widening operations as its merits and application become more generally known, and its use will materially increase the supporting value of the black base widening material. It is very important that this material properly carries its portion of the load, because under present-day traffic regulations all slow-moving heavy loads must move with the rear right wheel near the edge of the pavement. This subjects the newest part of the construction to the severest test because it must support one-half of the heaviest part of the load.

### Work in Ohio

Several years ago the State Highway Department of Ohio developed T-5 (hot-mix) bituminous concrete for salvaging worn brick, concrete and macadam roads. This wearing surface mixture is composed of broken stone, sand and asphalt, combined in proper proportions, mixed, and laid hot. The use of an asphalt finishing machine is required, which enables the contractor to secure a smooth-riding, even surface. Because of the grading of the mineral aggregate, the finished T-5 bituminous concrete surface represents one of the best, smooth-riding, non-skid wearing surfaces developed to

date. During the past two years the Ohio State Highway Department has awarded contracts for widening and resurfacing about 200 miles of worn brick, concrete and macadam roads with T-5 hot-mix bituminous concrete.

The illustrations in this article show the Cleveland trench tamper and other equipment used by the Brooks Construction Co. of Fort Wayne, Ind., on a pavement widening contract on U. S. No. 53, near Tiffin, Ohio. Law No. 54 asphalt produced by the Indian Refining Co., Lawrenceville, Ill., a Texas Co. subsidiary, was used on this contract.




*BUILDING UP THE WIDENED BASE AND RESURFACING THE PAVEMENT ON U. S. 53 NEAR TIFFIN, OHIO*

*1. Striking off the bedding course under the black base widening by hand, before consolidating it with the trench tamper. 2. The trench tamper working close to the old pavement. The first operation was to tamp the material close to the form and then work back against the irregular section of the old pavement. 3. The wedge or leveling course in place and tamped ready for the T-5 bituminous wearing surface. 4. The dump board and finishing machine riding on the steel form.*

*A Contributor to* *No. 3*

# Construction Progress

FOR the past decade, formal openings and dedications of the many new skyscrapers which have so changed the skyline of New York have been a frequent and common occurrence. Each project has seemed to mark an outstanding achievement or development in the building industry which has been publicized and lauded by speech and press at these formal occasions. Little has been said, and still less thought, by the public in general about one vital part of the construction of these buildings—the foundations, for these projects like almost everything else in life have had to have a solid foundation. And for many of these, Thomas Crimmins, President of the Thomas Crimmins Contracting Co., is responsible.

Among the buildings for which Mr. Crimmins has been the foundation contractor are One Park Avenue, Equitable Life Assurance Building, Pershing Square Building, Bowery Savings Bank and Metropolitan Tower as well as the nave of the Cathedral of St. John the Divine, Lord & Taylor's, R. H. Macy & Co., Rockefeller Institute and the Ritz Carlton. Other of his contracts in and around New York include work on the Pennsylvania Railroad Tunnels, the New York Croton Aqueduct, the East River Tunnel at 59th Street, the Fourth Avenue subway, Brooklyn, the elevated structures for the Transit Commission in Brooklyn, Queens and the Bronx, Section 3 of the Newark City Railway, Section F of the Yonkers Plant, Westchester County Sanitary Sewer, and the foundations for the Edison power house, East River and 14th Street, City Bank Farmers Loan & Trust Co. Building, 39 Broadway, First National Bank Building, 2 Wall Street, and the Savoy-Plaza addition.

Mr. Crimmins was born in New York City, in 1880. He attended New York schools and was graduated from Harvard with a Bachelor of Science degree, in 1900. On July 5, 1900, he joined his uncle, Thomas E. Crimmins, in business and in September became a partner, taking active charge of construction of trolley roads, laying of gas mains and opening of streets. In August, 1904, he bought his uncle's interest and organized the Thomas Crimmins Contracting Co. Most of his work has been in New York City and Westchester County, with the exception of a section of the Erie Barge Canal contract in Orleans County in 1908-10, and he has constructed many miles of street railway and laid gas mains, as well as excavating and pouring many of the foundations previously mentioned. During the war, Mr. Crimmins entered military service, and assisted in the organization of the Y.M.C.A. Building Bureau and in the construction of Camp Upton. He saw active service in France with the 102nd Engineers, A.E.F., 27th Division, and received his discharge as Colonel, Corps of Engineers, in 1919.

*Blank-Stoller, Inc.*

*Thomas Crimmins*

Mr. Crimmins has been and is a very active member of the construction industry. He is the President of the Contractors' Protective Association, a founder and former President of the General Contractors Association, New York, a member of the Executive Committee of the New York Building Congress, and a founder member and former President of the Harvard Engineering Society. He is a member of the New York State Chamber of Commerce and the Chamber of Commerce of the Borough of Queens. He also has many interests outside his immediate field of activity, including a number of directorates, and is a Director and a member of the Building Committee of the New York Post Graduate Medical School and Hospital and Vice President of the Reconstruction Unit of that hospital, a trustee of the Dry Dock Savings Institution and of the Museum of the City of New York.

A very healthy attitude toward life and toward labor and the construction industry in general mark Mr. Crimmins as a progressive thinker and a man of action. Regarding his work Mr. Crimmins says, "I have always been happy in my vocation, but it has really been a selfish life. I enjoy work. I like to have something to do. I don't find much to complain about with things or people but feel that to be happy one only has to be actively employed and practice the golden rule.

"So much of my life during the last 32 years has had to do with workmen engaged in the construction industry that I cannot help but think about the changes that have taken place in regard to the relationship existing during all this time between employer and employee. This relationship has improved so much and so steadily that I cannot help believing that in time we shall be rid of all the cruel and unfortunate misunderstandings and wrongs that have existed."

# How the Other Fellow Did It

*Ideas That Have Already Proved Helpful to Contractors*

## Paying for Haul, and Checking Quantities

**219.** On an extensive grading job where all of the trucks were owned by their drivers, the contractor devised a method of payment which worked out equitably. Each truck was paid by the load and received at the end of each day a slip showing the number of loads carried. Payment was at so many cents per load and when overhaul was required, a few cents per load was added. This method, which as far as is known is original with this contractor, worked out very satisfactorily to all concerned. The loads were varied according to a definite schedule, depending upon the type of material being handled. The contractor had a strict accounting system which each day checked the amount of material hauled. As soon as a reasonable amount of progress had been made by any outfit on a cut, the civil engineer for the contractor made a careful cross-section of the cut to determine the exact amount of material removed. This, checked with the number of loads hauled each day, and the type of material, gave him a close check on his costs. Before the work was started, an independent firm of civil engineers was employed by the contractor to make a complete survey of the entire project as a check on the quantities estimated by the state engineers. Thus the contractor had a complete picture of the entire job at any time and was not liable to be far off in his estimate of income and expenses. 24.1.66

## Removable Chairs for Center Steel

**220.** Most of the mid-west states required the placing of center steel, which must be supported at the specified distance above the grade until concrete has been poured over it. It is an expensive and ineffective operation to endeavor to support this center steel with concrete blocks, so most contractors have taken to using removable chairs of one type or another. One contractor used a steel plate cut to the proper height and welded to another plate which formed a base. Attached to this was a ⅜-inch rod long enough to reach out over the forms. As soon as the concrete was poured the rod was pulled, removing the chair from the grade. Other contractors used chairs made of bent rods with other rods as handles and still another contractor used rope for pulling the chairs out from beneath the concrete. 24.1.55

## A Well-Conceived Chute for Tandem Pavers

**221.** There is ample opportunity for spilling concrete between tandem pavers unless the chuting equipment between the two is well designed. Since tandem pavers were first placed on the market, numerous improvements have been made in these chutes. One contractor whose work we visited in the middle west had a very well designed device on the discharge of the No. 1 paver which prevented any spilling of grout or concrete when the discharge was made or immediately after. When the skip of No. 2 paver dropped to within 18 inches of the tie bar between the two pavers, it hit two rocker arms actuating a chute which was hinged at the bottom to the frame of the paver, and caused it to drop over the skip of the second paver. When the skip of No. 2 paver was raised it pressed against the sloping face of the chute on No. 1 paver and pushed it back, at the same time reversing the slope of the chute so that there was no dropping of grout or concrete from the chute. 24.1.54

## The Importance of the Master Mechanic

**222.** Too many contractors on large projects place the entire responsibility for the care of equipment and its operation on the shoulders of the superintendent. It is far better to employ a master mechanic and place all machines and motors under his supervision. A Michigan contractor did this and required that the mechanic inspect every machine daily for wear, grease, oil and intelligent operation, and all operators worked under his supervision. Motor oil was changed every 50 hours and some of the machines were thoroughly greased as often as every two hours. Breakdown reports and delays were down to a very small fraction by this rigid method of machinery maintenance. 24.1.61

## Storage of Asphalt and Fuel Oil for a Hot-Mix Asphalt Plant

**223.** In order to insure a sufficient supply of asphalt and of fuel oil on a hot-mix asphalt job operated at some distance from refineries, a contractor purchased two tank cars which were placed on broken spurs back of his asphalt plant. One of these was used for asphalt storage and the other for fuel oil storage. As cars of asphalt were received on the regular spur track serving the plant, they were heated with steam from the boiler at the plant and the asphalt forced into the storage tank by an asphalt pump. When fuel oil tank cars were received, the material was pumped direct to the fuel oil tank on top of the asphalt plant or to the storage tank on the broken spur, as required. 24.1.80

## Special Bulkhead Held Expansion Joint Material Firmly

**224.** A Detroit, Michigan, contractor, handling an extensive paving project west of Detroit, used a new type of expansion joint bulkhead which he developed in his own organization. It consisted of two 3 x 3-inch steel angles bolted together with a piece of 3/16-inch steel plate between and extending down from the top a distance of 6 inches. This gave a T to support the joint material in the slab during pouring. To hold the pieces of premoulded expansion joint firmly, there were three pins through the horizontal leg of one of the angles with cams in the lower section, so that when the pins were rotated, they pressed the cams firmly against the expansion joint material and held it when the bulkhead was inverted and placed on the forms. The expansion material was in 5-foot by 10-inch sections so that four were required for the width of the 20-foot slab. The bulkhead had a pair of pipe handles at each end to facilitate handling. 24.1.58

## Stairways for Trucks

**225.** In order to avoid long roundabout hauls from the top of steep through cuts to fills in the bottom of adjacent valleys, a contractor whose job we visited laid out "stairways" or winding roads to the bottom of the fill. As these were gradually raised, the trucks took the steep grade at the top in first when going down loaded and also in coming up empty. A straight road from top to bottom would have been impossible for any truck to negotiate either loaded or empty and a trip around on a reasonable grade would have entailed several miles of unnecessary haul. 24.1.66

# The Editor Comments

### Construction and Politics

Franklin Delano Roosevelt, emulating his worthy cousin, the late Theodore Roosevelt, has ably wielded the "Big Stick" over his pro-Roosevelt Congress, and now we have beer, a real economy program and some farm relief legislation. Thus far, the "Big Stick" of patronage has been most effective but will it continue to be wielded constructively and in a manner that will not merely pile up bond issues for the next two generations to pay off but be directed toward financing construction projects such as water works, sewage disposal plants, pipe lines, highways and other projects which will furnish a legitimate return upon the investment made. Thus, money secured from present bond issues may be made to put hundreds of thousands of men to work and not be a burden upon the present or next generation of tax payers.

As we have stated before, two billion dollars expended within the next one or two years on projects of this kind will go a long way toward solving unemployment and, through the large proportion of money which will go into wages, will start business on its road to recovery through its expenditure in the small shops of our nation. This will lay a real foundation on which business can stage its recovery.

### A Practical Investment in Morale

At a total expense of slightly less than $10,000, the B. F. Goodrich Co., Akron, Ohio, accomplished much good for unemployed men in Akron who had formerly worked in the Goodrich factory, maintained their morale and furnished them with vegetables which, with proper treatment in the homes, would last an average family for nine months. This is the story briefly. Goodrich leased 200 acres of tillable land, five miles from its factory, re-employed a former Goodrich engineer with farm experience and with the help of state and county agricultural experts planned a cooperative vegetable garden.

A total of 936 men actually took an active part in the gardening, investing from 4 to 290 man-hours each or an average of 12 eight-hour days per worker over a period of twenty-five weeks. These men were furnished transportation from the Goodrich factory to the farm and back, were furnished the necessary hand tools and a noon-day lunch. The entire group was made up of present part-time employees and former employees of the Goodrich factory. The men's investment of time was paid for by proportionate distribution of vegetables daily and at the end a proportionate distribution of the bulkier vegetables. One man who worked one day a week on the garden during the season without extra work or absence received the following items totaling in weight more than 1 ton: 22 bushels of potatoes, 127 pounds cabbage, 98 pounds tomatoes, 95 pounds corn meal, 76 pounds turnips, 75 pounds navy beans, 69 pounds green beans, 31½ pounds summer squash, 25 pounds rolled oats, 23 pounds greens, 10 pounds pumpkin, 8 pounds peas, 5 pounds kale, 1 pound dry onions, 16 dozen Cayenne peppers, 10 dozen sweet corn, 7 dozen green onions, 7 dozen hot peppers, 4 dozen carrots, 4 dozen radishes, 3 dozen beets, 2 dozen sweet peppers.

Goodrich has published a booklet giving the story of its cooperative farm plan which should be in the hands of every manufacturer who would like to do the most for its part-time and former employees with the necessary minimum expenditure of money. Many contractors who formerly had large organizations may wish to know of this plan. A careful reading of the booklet has so impressed us that we have given you this abridged picture of the fine work and notable accomplishment in Akron.

### What the Four Cent Tax Means on Lubricating Oil Costs

A statement based on careful cost data from an industry whose equipment closely parallels that of the construction industry shows that for both high grade and low grade oil the 4-cent tax amounts to a sales tax of 16 or 43 per cent. This company used 1,154.8 gallons of high grade oil and 3,484.4 gallons of low grade oil in 1932. The per cent of increase in cost in the high grade oils due to the 4-cent tax was 15.45 per cent and for the low grade oils 42.76 per cent. With diversions of gas tax money from legitimate road construction and the creation of the 4-cent tax per gallon on lubricating oils the construction industry is on one side being deprived of its business opportunities and on the other hand having a burdensome tax placed on a necessary operating and maintenance product.

### Federal Highway Legislation

Opposing forces are exerting strong influences to keep highways out of the Federal public works program. Both emergency and regular Federal Aid appropriations are in jeopardy. Write to Washington endorsing Federal highway aid and urge favorable action in Congress.

Theodore Reed Kendall

# Construction Industry News

**Portland Cement Association**, 33 W. Grand Ave., Chicago, Ill., has announced the appointment of W. D. M. Allan, who has been Manager of the Cement Products Bureau since 1926, as Director of Promotion with responsibility for the planning and direction of the following six departments: Advertising and Publications, General Educational, Cement Products, Highways and Municipal, Railways and Structural Bureaus.

**Littleford Bros.**, 485 E. Pearl St., Cincinnati, Ohio, has announced the appointment of the following three new distributor connections since the first of the year: The Smith Booth Usher Co., Los Angeles, Calif.; R. W. Simpson, Des Moines, Iowa, and The Ray Corson-Elkins Co., Denver, Colo.

**Superior United Corp.**, 1850 So. Kostner Ave., Chicago, Ill., incorporated under the laws of Illinois with permission to do business in Indiana, has been organized from the officers of the Superior Construction Equipment Co., W. R. Sostheim, John Erby and O. E. Quinton; G. F. Lowe, formerly President, G. F. Lowe Co.; and G. E. Hillsman, formerly President, G. E. Hillsman Co. The warehouses, offices, showrooms and service station are located at the above address. It will be distributor for the entire Chain Belt line, Butler bins, Le Roi air compressors, Heltzel forms, Byers shovels and other equipment to round out the line.

**E. D. Etnyre & Co., Inc.**, Oregon, Ill., has announced with deepest sorrow the death of its President, Edward D. Etnyre, on Friday, March 10, 1933.

**The Asphalt Institute**, 801 Second Ave., New York, at its Annual Meeting, elected B. L. Boye President of the organization to succeed William H. Kershaw of the Texas Co. Mr. Boye, who has been with the Standard Oil Co. of New York for 33 years, is now in charge of that company's asphalt and fuel oil activities. Other officers elected were: Vice-Presidents, Leroy M. Law, Shell Petroleum Corp.; A. M. Maxwell, Vice President of the Standard Oil Co. of Ohio, and J. A. Blood, Standard Oil Co. of California. W. W. McFarland, President, Warner-Quinlan Co., was elected Secretary, and Herbert Spencer, Standard Oil Co. of New Jersey, was elected Treasurer, with W. E. Gilligan of the same company as Assistant Treasurer. The Board named C. W. Bayliss, Barber Asphalt Co., as Chairman of the new Executive Committee, with J. S. Helm, Standard Oil Co. of New Jersey, and Messrs. Boye and McFarland as the other members of the committee. J. E. Pennybacker continues as Managing Director of The Asphalt Institute.

**Easton Tractor & Equipment Co., Inc.**, Alexandria, La., has recently moved its quarters from 2025 Lower Third Street to Lee and Harris Streets, Alexandria.

**General Tractor & Equipment Co.**, 2329 University Ave., S.E., Minneapolis, Minn., has been merged with the Wm. H. Ziegler Co., Inc., of the same address. The former company was a subsidiary of the Ziegler organization and has been reconsolidated into the parent company. The Wm. H. Ziegler Co., Inc., is a member of the A. E. D.

**Wisconsin Motor Co.**, Waukesha, Wis., has changed its name to Wisconsin Motor Corp., following a financial reorganization. This involves no change in management or personnel.

**The Heltzel Steel Form & Iron Co.**, Warren, Ohio, has recently appointed the following new distributors for Heltzel bins, batchers and bulk cement equipment: F. H. Burlew Co., 221-225 W. Huron St., Chicago, Ill.; Arthur W. Davis, 325 W. Georgia St., Indianapolis, Ind.; Industrial Machinery Co., 430-32 Minnesota Ave., Kansas City, Kans.; H. O. Penn Machinery Co., 140th St. & East River, New York, N. Y., and the Cook & Brown Lime Co., Oshkosh, Wis., which handles the entire Heltzel line.

**Sullivan Machinery Co.** has announced the election of Arthur E. Blackwood as Chairman of the Board of Directors and Henry S. Beal as President to succeed Mr. Blackwood. Mr. Beal comes to the Sullivan Machinery Co. from the Jones & Lamson Machine Co., Springfield, Vt., of which he was General Manager. He has been Director and President of the National Machine Tool Builders' Assn.

**Johns Manville Sales Corp.**, 292 Madison Ave., New York City, has taken over the distribution of Cork-Tex expansion joints for concrete roads and structures made by the Bond Mfg. Corp., Wilmington, Del. This material will be known in the future as J-M cork expansion joint.

**Four Wheel Drive Sales Co.**, Clintonville, Wis., has announced the appointment of A. J. Steffick as district sales supervisor for Utah, Idaho, Montana and the Yellowstone Park District. This means a reduction in the size of territories formerly served by factory representatives E. M. McLean and P. M. Schmidt and will make possible more frequent contacts with dealers, prospects, and FWD truck operators. This change in districts is in line with the 1933 FWD sales program whereby more concentrated sales effort will be made in selected territories and markets. Mr. Steffick's headquarters will be at the Bannock Hotel, Pocatello, Idaho.

**Gash-Stull Co.**, Chester, Pa., distributor of Fordson tractors, Universal and Michigan power shovels, Osgood shovels, road machinery and contractors' supplies, has absorbed its wholly owned subsidiary, the G. M. Stull Co. W. D. Gash is President and G. M. Stull, Treasurer.

**Chain Belt Co.**, Milwaukee, Wis., has announced the appointment of Alex S. Kennedy as Manager of its new branch office in Kansas City. Rex chains, power transmission equipment, elevators, conveyors, traveling water screens, sanitation equipment, and Stearns belt conveyor idlers, formerly marketed in this territory by the St. Louis office, will be handled by the new Kansas City office. Chain Belt Co. has also announced the appointment of the R. L. Harrison Co., Inc., Albuquerque, New Mexico, and the newly-organized Ray Corson-Elkins Co., of Denver, Colo., as distributors for its complete line of Rex construction equipment including pavers, building mixers, pumps, saw rigs, plaster and mortar mixers, cold patch mixers, Motomixers and Moto-agitators.

**Keller Tractor & Equipment Co., Inc.**, 5130-63 Martin Ave., Detroit, Mich., has been appointed distributor by the Chain Belt Co., Milwaukee, Wis., for the Rex line of construction equipment.

**Northwest Engineering Co.**, 28 E. Jackson Blvd., Chicago, Ill., has announced the appointment of three new distributors of Northwest excavating and material handling equipment as follows: John C. Louis, Inc., Baltimore, Md., for the state of Maryland and Washington, D. C.; Blaisdell-Folz Equipment Co., Cincinnati, Ohio, for that city; and C. J. Burke, Detroit, Mich., for eastern and southern Michigan.

# New Buckets Handle Stiff Concrete

THE handling of stiff concrete with buckets has been studied intensively by the Materials Handling Division, Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa., resulting in a new line of concrete buckets available in single and double-line types, both of which are cylindrical in construction and consist mainly of an inner and an outer shell. The outer shell is a true cylinder, extended to form a base for supporting the bucket while it is being filled, while the inner shell is a flattened cone, the discharge end of which is oval in shape.

The single-line bucket is of the controllable bottom-dump type, provided with a hand-operated radial gate which, regardless of the exceptionally large discharge area, can be controlled readily by one man. Friction between the gate and the concrete is eliminated by a roller cage which supports a rubber-covered conveyor belt discharge apron. The gate is opened or closed by moving the roller cage beneath the conveyor belt, eliminating horizontal and radial motion of the conveyor belt which is hinged so that it is free to advance toward or recede from the opening, depending upon the position of the roller cage. The rollers are mounted on sealed anti-friction bearings. The discharge opening of a 2-cubic-yard bucket is 27 x 32 inches oval.

The two-line type of concrete bucket has a plate steel shut-off gate of the radial type operated by a twin bail, the movement of which is transmitted to the gate by a rod connection. The twin bail is built rigidly in one member pivoted at bracket connections on each side of the bucket. When the filled bucket is supported in the air, the weight of the load tends to force the bail against a stop, thus holding the gate firmly in the closed position so it cannot respond to any pull exerted by the resistance to cable overhaulage on the dump line. The dumping operation is accomplished by transferring the load from the holding line to the dumping line, causing the bail to rotate, and thus imparting the motion to the gate through the rod connection. One of the principal advantages of the twin bail arrangement is preserving the true suspension of the bucket while keeping the two lines well separated, avoiding interference. The two-line concrete bucket is available in sizes ranging from 1½ to 8 cubic yards.

Automatic discharge of the single-line buckets is accomplished by supporting the loaded bucket from the crane hook so that the load is utilized as a force acting to open the radial gate. In this arrangement, the gate is locked in closed position by means of a pair of folding arms or toggles. As soon as the toggle is released by a pull on the hand trip line, the radial gate immediately opens by gravity. This automatic dumping feature has proved valuable in placing concrete by cableway, especially if the concrete must be placed a considerable distance from the vertical plane of the "high line." The bucket is swung as a pendulum until the arc of its movement extends to the edge of the foundation or footing being poured, then the hand trip line is pulled with the result that the entire load can be instantly discharged at a point 15 to 20 feet from the vertical plane of the cableway.

# A One-Piece Renewable-Lip Power Shovel Dipper

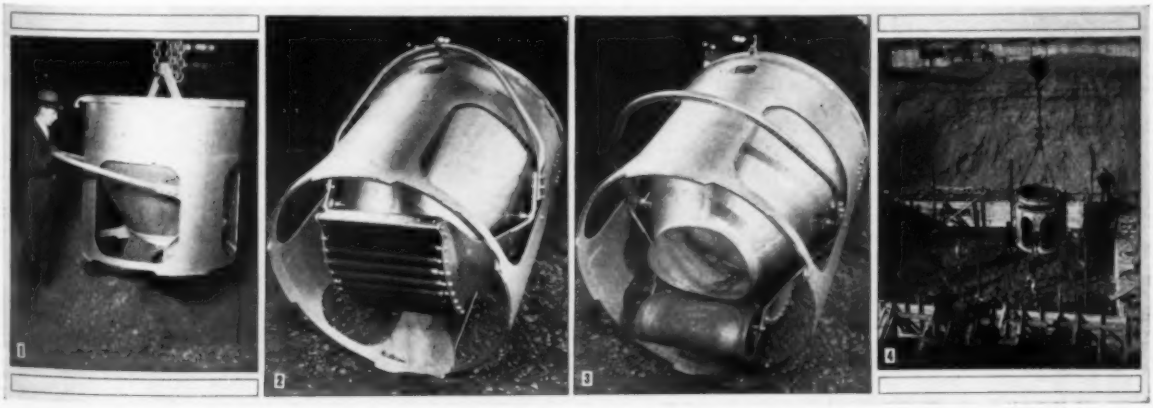
A NEW one-piece renewable-lip bucket which offers a substantial reduction in weight over the solid manganese steel bucket of the older type, has been announced by the American Manganese Steel Co., Inc., Chicago Heights, Ill. This makes possible in some cases the use of a larger dipper than the standard. The elimination of overlapping joints and the use of comparatively light double-wall sections in place of single-wall sections, has added strength and rigidity. The lip can be renewed in the field without riveted connections. The tooth bases are cast as an integral part of the lip, making the bucket particularly adapted for rock or heavy materials. Where the shovel is working in loose material or dirt or even sticky clay, a thin cutter type of lip may be employed, either with separate teeth or with the teeth cast as an integral part of the lip structure. These buckets are made from ⅜ to 2-yard sizes for any make of shovel.

# A Giant Tractor

THE largest addition to tractor equipment is the new Seventy announced by Caterpillar Tractor Co., Peoria, Ill. These tractors are equipped with Caterpillar diesel or gas engines as desired and are newly engineered and designed throughout, being bigger, more rugged and so designed and built to minimize time lost in service and repairs which is the bane of the contractor on practically every job.

The Caterpillar Seventy has eight speeds of which six are forward and two reverse. It has a new proved track design, new swing frame construction, six track rollers on each side, advanced idler design, sturdier final drives to handle the increased power, and the weight and balance are planned for performance.

More effective oil seals are built into the tractor which has increased traction, greater accessibility and adjustable pedals for the convenience of the operator and a single gear shift lever with handy upright steering control and complete visibility for the operator.



*THE NEW BLAW-KNOX CONCRETE PLACING BUCKET*

1. *Operating the hand controlled roller gate.* 2. *A bottom view of the bucket with the gate closed showing the rollers.* 3. *The gate opened.* 4. *A single line hand-tripped bucket placing mass concrete.*

*The Fairfield Portable Belt Feeder*

# A New Portable Belt Feeder

AN addition to its line of material handling equipment has recently been announced by the Fairfield Engineering Co., Marion, Ohio. This new portable belt feeder, which is designed to facilitate the unloading of loose bulk materials such as sand, gravel or crushed stone, from hopper-bottom cars, receives the material as it drops from the hopper, carrying it for further distribution to a portable or stationary conveyor or elevator.

This Fairfield feeder is 18 inches wide and 14 feet long and is powered by either a 3-horsepower electric motor or a 4½-horsepower air-cooled gasoline engine as desired. The rubber belt is 18 inches wide, fitted with flat cleats on close centers. The belt edges are amply protected. Replaceable wear angles fitted to the frame of the feeder holds the belt in position at the curved section of the feeder. The carriage wheels are mounted on spindles that can be lowered as much as 8 inches to compensate for inequalities in the level of the yard where the feeder is used. Drive from the power unit to the head shaft is through a series of steel roller drive chains running over a series of machined sprockets. Complete pressure lubrication is provided throughout.

# New 1933 Truck Models

THE 1933 line of trucks, manufactured by the Federal Motor Truck Co., Detroit, Mich., have a number of improvements in design and appearance, including a long stream-line hood with ventilating doors, a chromium-plated slanting V-type radiator, wide fenders, heavy chromium-plated bumper, extra large chromium-plated head lamps and twin disc chrominum-plated horns mounted on the head-lamp bracket.

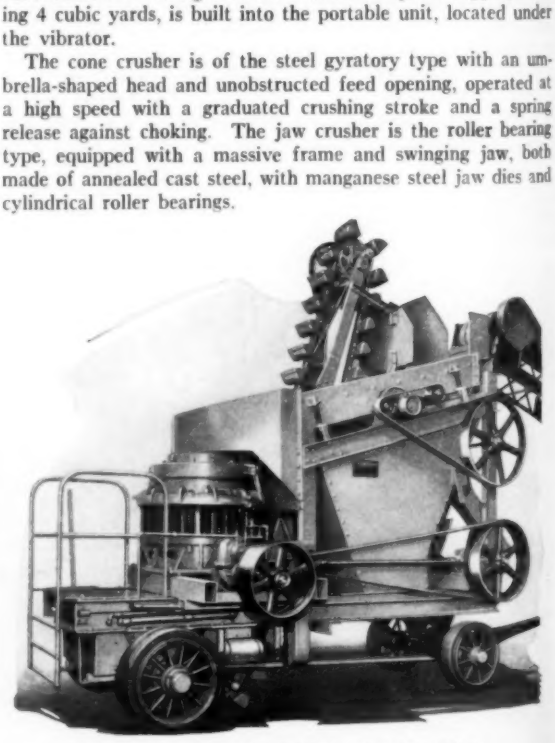
The 1½-ton model is available with 4 and 6-cylinder engines in the following wheelbases: 130 inches, 142 inches, 154 inches and 166 inches. The 4-cylinder power plant develops 50 horsepower and the 6-cylinder engine develops 64 horsepower at 2,500 rpm. Standard tires are 6.00/20 balloons on the front wheels and 32 x 6 high pressure rear tires. The tires are all of the truck type mounted on ventilated disc demountable wheels, with duals available at a small extra cost. Other features of the 1½-ton Federal are the 10-inch heavy-duty clutch, 4-speed transmission, full-floating rear axle, sturdy pressed steel chassis frame and four-wheel hydraulic brakes.

Two other models of the new series carry pay-load ratings of 2½ to 3 tons and 3½ to 4 tons. These models are powered by heavy-duty 6-cylinder truck engines of 72 horsepower at a governed speed of 2,400 rpm, and 85 horsepower at 2,500 rpm respectively. These new Federals have heavy-duty truck-type single plate clutches, a 12-inch clutch on the 2½ to 3-ton model and a 13-inch clutch on the larger model. A special spring-type dry disc is used in this clutch to absorb vibration. Both models have an easy shifting 5-speed transmission, with a silent fourth speed, as well as tubular propeller shafts with universal joints of the roller bearing type. The chassis frame is the fish belly type with a 10-inch section at the deepest part. Frame side rails are ¼-inch thick with 3½-inch flanges. The front springs are shackled at the front, to add stability to steering and handling the truck. The rear end of the rear spring is the floating contact type, eliminating shackles, spring pins and bushings. Auxiliary springs are standard equipment. The service brakes are hydraulic four-wheel fully-enclosed type actuated by a vacuum booster. Tires on the smaller of the two models are 8.25/20, mounted on 20 x 7 cast spoke type wheels while on the larger model, the tires are 9.00/20 mounted on 20 x 8 cast spoke type wheels. The following wheelbases are available in both models: 153, 163, 175, 185, 197, 210, 223 and 237 inches.

# A Portable Crushing, Screening and Loading Plant

THE Telsmith portable crushing, screening and loading plant which is equipped with a Telsmith No. 24 cone crusher for products finer than ¾-inch and larger capacities of ¾ to 1-inch rock, or a Telsmith-Wheeling jaw crusher for ¾ to 1-inch rock in moderate capacities; a vibrating screen 3 x 8 feet and a standard plate feeder which regulates the tonnage delivered to the conveyor, is made by the Smith Engineering Works, Milwaukee, Wis. This portable plant, the crushing equipment of which is the type used in commercial plants, is designed to meet the latest state highway department specifications. It is equipped with a 16 x 45-foot finished product conveyor and a portable steel bin of 10 or 20-cubic yard capacity. If preferred, a short conveyor may be substituted for loading direct to a truck. A plant hopper, holding 4 cubic yards, is built into the portable unit, located under the vibrator.

The cone crusher is of the steel gyratory type with an umbrella-shaped head and unobstructed feed opening, operated at a high speed with a graduated crushing stroke and a spring release against choking. The jaw crusher is the roller bearing type, equipped with a massive frame and swinging jaw, both made of annealed cast steel, with manganese steel jaw dies and cylindrical roller bearings.



*The New Telsmith Portable Crushing Plant*

# A 1933 Pressure Distributor

THE 1933 model Kinney asphalt distributor made by the Kinney Mfg. Co., 3529-3541 Washington St., Boston, Mass., is constructed with an oval tank and an oil-burning heating system consisting of two burners firing directly into large return tubes located near the bottom of the tank. A stack is provided at each end of the tank with covers so arranged that either two or three passes of the hot gas can be utilized as desired by the operator. When using only two passes of gas, less than one-fifth of a tankful can be heated safely and when used with the complete tube area for heating, less than one-third of a tankful can be heated safely.

Since a pressure distributor is essentially a machine for measuring bituminous materials onto the road, the type of pump used is of vital importance. The Kinney distributor uses a jacketed-type Kinney pump, which is accurate when used as a meter, and as the engine speeds are carefully governed and tested before leaving the factory, the desired quantities can be applied to the road with almost absolute uniformity. A pump with a positive displacement of 448 gpm is used on this distributor, making it possible to apply 3 gallons per square yard to roads 20 feet wide at one application, with truck speeds that are readily available.

*The New Kinney Bituminous Distributor*

As road speeds and pump capacity are necessarily in direct relation to each other, this unusually large pump capacity makes possible the use of trucks with correspondingly high road speeds with resulting interesting performance records in total output for a day and correspondingly low operating costs. The Kinney pump is also used to circulate the material while heating, to load the material from tank cars, and to apply the material to the road under pressure.

All Kinney distributors have as standard equipment sidewise control, or lateral movement of the spray bars, to enable the operator to offset for curbs or to bring together adjoining strips without excessive laps or leaving bare spots. The pump is flanged directly to the bottom of the tank, the tank being provided with an inside closing valve. This construction avoids the use of suction piping when applying material to the road, doing away with all pipe friction on the suction side and making the large pumping capacity possible.

# A Wheelbarrow Platform Scale

A BEAM platform scale of sturdy construction, welded in one piece and designed particularly for contractors handling small bridge jobs, culverts and head walls, has been announced by the Best Scale Co., 1123 Adon St., Pittsburgh, Pa. The scale is capable of handling a 1,200-pound moving load concentrated at one end of the platform which is supported by Stellite-metal-coated knife edges 1½ inches in length. The weigh beams are of non-corrosive cast alloy aluminum and the poise is of the square type with a center indicator and positive set screw lock. Each beam box is equipped with a plus and minus fan-type dialed indicator, the hand of which moves a total distance of 8 inches. The indicator is so constructed that neither a liquid nor an air dash pot is required.

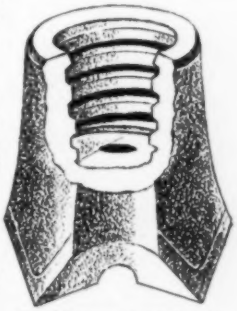

*A Wheelbarrow and Cement Cart Batching Scale*

The main scale frame is built of open hearth structural steel and all joints not welded have a coat of paint before assembly. The scale frame is 6¼ inches in depth and is equipped with a wheelbarrow ramp platform of ¼-inch steel plate, 11 inches wide and 14 inches long so attached to the scale frame that it will fold up over the platform for shipping.

# Triple-Treated Detachable Bits

ONLY three years ago detachable bits were known to but a few contractors. Now several manufacturers are producing them, the latest being the Crucible Steel Company of America, 405 Lexington Ave., New York City. These makers of Crusca drill steel are now offering Crusca detachable bits with hollow drill shanks. The bit is one piece for strength and economy and is of a high quality tool steel. The cutting edge of the bit is designed for maximum cutting speed and maximum penetration with minimum gage reduction. Back of the cutting edge is an unusually heavy section of steel on which, and directly bearing on it, is the Crusca shank and threaded drill rod forming an assembly insuring no breaking or breakdown in the collar on the threaded section.

These triple-treated bits are made in three groups to fit Crusca shank steel and the same letters symbolize the steel size which they fit. "A" bits fit on 1-inch hollow round steel with ⅞-inch hexagon x 3½ long shanks. "B" bits fit on 1⅛-inch hollow round steel with 1-inch hexagon x 4½-inch long shanks and "C" bits fit on 1¼-inch hollow round steel with standard lugged shanks.



*The Crusca Detachable* ***Bit***

# A New Crawler Shovel and Crane

A NEW line of crawler shovel and crane equipment ranging from ¾, ½ to ⅜-yard and known as the Lorain 40 and 30 has been announced by the Universal Crane Co., Lorain, Ohio. These machines are equipped with Center Drive, a feature of all machines made by the parent company, The Thew Shovel Co., and in addition has a balanced design which permits greater capacities per pound of weight. The working weight of the Lorain 40 as a ¾-yard shovel is approximately 30,000 pounds and of the Lorain 30 as a ½-yard shovel, approximately 23,000 pounds. The dippers on the units and their crane ratings conform to the standards of the Shovel and Crane Manufacturers Association.

The shovel boom and dipper stick are of all-steel construction, the latter being a 7-inch one-piece tube. The Center Drive boom construction with the shipper shaft at the center of the boom aids in giving these units greater ranges. An automatic dipper trip is provided as standard equipment, a slight pressure of the operator's elbow starting the device which uses engine power to dump the dipper.

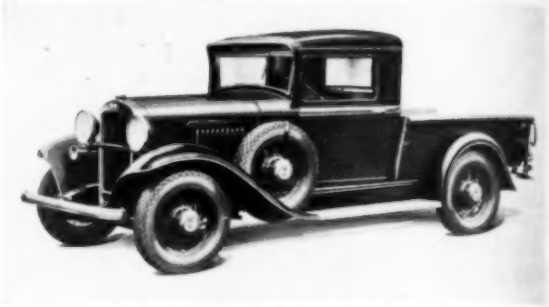
*One of the New Lorain Crawler Shovels*

Crane, clamshell and dragline booms are of single piece, all-steel construction in 25, 30, 35-foot lengths with 5, 10, and 20-foot extensions available. The dragline is equipped with a fair-lead of new design which keeps the cable constantly on the sheaves and permits the front sheaves to pivot. The units are mounted on 2-speed Center Drive crawlers and are powered with 6-cylinder Waukesha motors. All control levers are conveniently located at the operator's position at the front of the platform where the operator has wide vision to either side and vertically for high booms.

# A New Half-Ton Truck

A NEW International ½-ton motor truck has recently been announced by the International Harvester Co. of America, 606 So. Michigan Ave., Chicago, Ill. This new Model D-I enlarges the line of Internationals which now extends from a ½-ton to a 7½-ton heavy-duty unit in a variety of types.

This new model, with an all-steel pick-up body, is sturdy, speedy and economical for use on miscellaneous jobs around a contractor's camp, carrying tools, men and so forth on road jobs, or for the various odd jobs connected with road and street maintenance work.



*The New International ½-Ton Truck with Open Body*

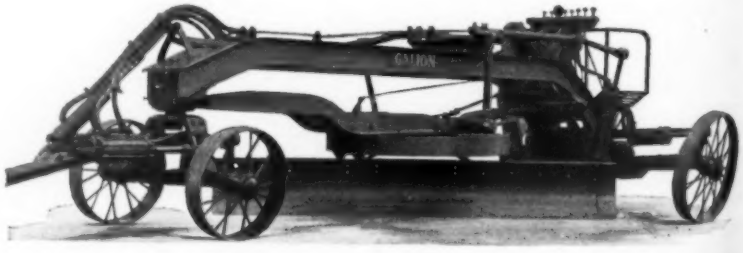
The chassis of this new model has a wheelbase of 113 inches and is powered by a 6-cylinder engine of modern high-compression design which develops 70 horsepower at 3,400 rpm. Features of the engine are down-draft carburetion and full pressure lubrication to the main, connecting-rod and camshaft bearings. The 9-inch clutch is of the single-plate type with built-in vibration damper. The transmission has three speeds forward and reverse. The final drive is of the spiral-beveled gear type with semi-floating axle shafts. Semi-elliptic front and rear springs are of chrome-vanadium steel and have self-adjusting shackles. Forty-spoke 18-inch wire wheels, a left front fender well, spare wheel and spare wheel carrier are standard equipment. The pick-up body has a loading space 66 inches long and 46¾ inches wide. The side panels are 11 inches high with 6-inch flare boards.

# Hydraulic Control on a Leaning Wheel Grader

NO matter what adjustment you wish to make on the 10, 12 or 14-foot Galion leaning grader, all that is necessary is to move one of the eight short range levers slightly forward or backward, and the hydraulic power unit either leans the wheels, side-shifts the frame on the rear axle, raises or lowers the moldboard, one side or both at the same time, side-shifts the moldboard, adjusts the scarifier or operates the steering gear.

With the controls located directly in front of the operator and with little attention required in working the levers, the operator can follow the work carefully and accurately. Power is supplied by a small single cylinder 4-cycle gasoline engine of 1,500 rpm which operates the pump supplying oil to the various cylinders. The operation is entirely free of clutches, gears, universal joints, telescopic shafts and other wearing parts which call for constant attention and lubrication.

These hydraulic leaning wheel graders which are equipped with a 12 or 14-foot moldboard and blade, are made by the Galion Iron Works & Mfg. Co., Galion, Ohio.




*The New Galion No. 14 Leaning Wheel Grader with Hydraulic Control*

# Barrett Tarvia

GOOD ROADS at LOW COST

*Colvin Road, Randolph County, Indiana. Surface-treated gravel.*

The Barrett Company

| | | |
|---|---|---|
| New York | Chicago | Philadelphia |
| St. Louis | Minneapolis | Boston |
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| Buffalo | Columbus | Milwaukee |
| Providence | Syracuse | Birmingham |
| Lebanon | Toledo | Cincinnati |
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| Rochester | | Portland, Me. |

THE BARRETT COMPANY, Ltd.
Montreal Toronto Winnipeg Vancouver

**Every community which subscribes to a "save what we've got" policy is irresistibly attracted to Tarvia economy and Tarvia performance.**

**With Tarvia, existing roads can be put into first-class shape quickly—cheaply. Tarvia penetrates deeply into the roadbed and effectively binds the aggregate. It holds the stone or gravel firmly exposed on the surface, thus providing a smooth, easy-riding, lastingly non-skid road.**

**An experienced Tarvia field man will gladly suggest simple, inexpensive repair and maintenance methods that will protect your investment in existing roads. The uniformity and dependability of Tarvia plus the intelligent supervision of the Tarvia field man will assure consistently satisfactory results. 'Phone, wire or write our nearest office.**

During April we hope you will remember to mention CONTRACTORS AND ENGINEERS MONTHLY.

# Air Conditioning for Motor Trucks

AN air filter designed for the protection of all kinds of road building equipment, including motor trucks, where severe dust conditions are likely to be encountered, is manufactured by the Air-Maze Corp., Caxton Bldg., Cleveland, Ohio. The necessity for this type of air-filter protection is brought out very clearly when it is considered that 1,200 cubic feet or 8,400 gallons, volumetric measure, of air is consumed for every gallon of gasoline. The new Air-Maze filter is of the heavy-duty oil bath type and provides a circumferential air entrance with oil sprayed into the air stream. The air then passes through a large capacity filter element of fourteen-mesh, evenly-woven screen which is continually washed by the oil bath. The unit permits full motor power without restriction at any speed and is easily installed and serviced. The oil bath is of very large capacity to provide for unusual conditions, and no oil is removed from the bath by the air flow.

*The New No. 55-OB Air Filter*

# A New Model 10 to 13-Yard Crawler Wagon

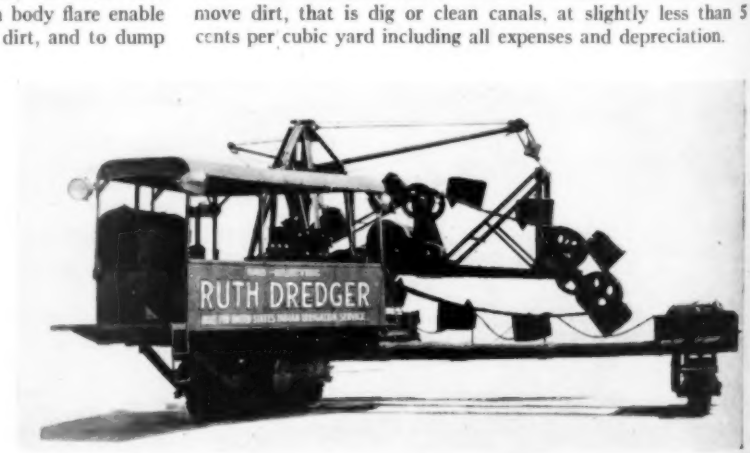
A 10 TO 13-yard crawler wagon designed to meet contractors' demands for larger capacity wagons for use with modern high-powered, high-speed tractors has been announced by the Trackson Co., 1323 S. First St., Milwaukee, Wis. This wagon is a bottom-dump crawler wagon with a full 10-cubic yard struck measure capacity and 13 cubic yards heaped measure. It has a straight tubular tongue, giving a straight-line draft without interfering with short turning; the flare board is reversible; the low loading height makes it adaptable for loading with elevating graders; its extra wide and long doors in conjunction with minimum body flare enable it to unload quickly even with heavy sticky dirt, and to dump the dirt in the exact spot where the operator wants it. Its high clearance underneath the frame permits it to pull onto or off the dump quickly and easily. Only one lever is used for both dumping the load and winding up the doors. Cable protectors on the wind-up drum prevent the cable fouling over the drum flanges. The rear step and platform is wide, safe and convenient for the wind-up man. The single pair of full-length doors is made of heavy steel plate flanged and reinforced with angles.


*A New 10 to 13-Yard Crawler Wagon*

The drawbar spring in the end of the tubular tongue is completely enclosed, protecting it from dust and dirt. This spring and drawbar is an assembly in itself and can be removed from the drawbar for repairs by simply removing two bolts. Trackson 20-25-ton crawler wheels are used on this wagon and have double-strand tension members. They are of the same general construction as the 15-ton size except that two strands of drop-forged, heat-treated tension members are used.

# A Bucket-Type Dredger and Ditch Cleaner

A BUCKET-TYPE excavator with a patented self-cleaning bucket which makes it possible for the machine to clean or dig ditches or canals even when they are full, or practically full, of water is manufactured by the Ruth Dredger Mfg. Corp., Ltd., 5980 So. Boyle Ave., Los Angeles, Calif. Because of the narrow bank or berm of most drainage ditches and canals the Ruth dredger is designed to work by spanning the ditch and it will operate on canal banks which are only 24 inches wide. Conveyors may be attached to the digging unit to carry the excavated material out as far as 20 feet from the ditch. The standard machine has a transmission with 12 different speeds so that the digging speed and forward traction speeds may be synchronized, depending upon the amount and kind of material to be excavated. The new models are manufactured with either gas, electric or mechanical drive. Government records show that the new models will move dirt, that is dig or clean canals, at slightly less than 5 cents per cubic yard including all expenses and depreciation.




*A Bucket-Type Machine for Digging and Cleaning Irrigation Ditches and Canals*

# This is not the time to let taxpayers' dollars go up in road dust

NEVER before has the expenditure of public moneys placed upon officials such a sharp responsibility for good management and wise economies. During the recent great era of prosperity the citizens of most every progressive community cheerfully pledged thousands of future tax dollars for improved roads. But money is no longer so plentiful. The means to highways adequate to traffic conditions must first regard low cost in construction and upkeep.

Many of the miles of improved highways are gravel-surfaced—a splendid and economical type of construction, but one which requires constant maintenance. Therefore, no "pruned" highway budget is truly economical if it fails to provide for adequate maintenance of these "secondary" roads. Permitting them to "ravel," become ground into dust and be washed, pushed and blown away is downright extravagance. It means rebuilding them years before it would otherwise be necessary.

### *What causes road surfaces to crumble and dust?*

"The constant pounding of traffic," is the common answer. But by the rules of logic "pounding" really ought to pack stone and soil together all the more tightly. It will—*if they are kept moist.* But how? Rains are too infrequent. And constant sprinkling is out of the question. Nevertheless, there *is* a way: *Treat road surfaces with Calcium Chloride.*

This white, flaky, odorless, non-tracking substance *draws moisture out of the air*—and keeps the surface moist even on hot, dry days. It provides the ideal means for treating unbonded road materials in that it supplies moisture—the very thing needed to bind and compact the surface mat. The saving in many cubic yards of valuable road surface material per mile, per season, usually more than pays for the Calcium Chloride. In addition, Calcium Chloride reduces the blading and surface manipulation necessary to maintain a smooth riding surface. It also makes it possible to smooth up the roads in dry weather, when it would otherwise be impossible to do so effectively. Add to this the further advantage of eliminating traffic hazards, health menace and the discomfort of road dust.

The Calcium Chloride method of economically maintaining road surfaces and controlling road dust has already been proved on more than fifteen thousand miles of highway. Every highway engineer and other road official should know all about it. Try it out on a few miles if necessary to convince yourself. The results will be these: Less patching. Less adding of fresh surface materials. Fewer draggings. A longer-lasting, smoother and better riding road. . . . A definite saving in maintenance costs—and, in the end, less drain on the taxpayer's pocketbook and more credit to your managerial acumen.

For complete information about Calcium Chloride, write to any of the following members of the

**● CALCIUM CHLORIDE ASSOCIATION**

THE DOW CHEMICAL COMPANY . . . . . Midland, Michigan
SOLVAY SALES CORPORATION . . . 61 Broadway, New York City
THE COLUMBIA ALKALI CORPORATION . . . . Barberton, Ohio
MICHIGAN ALKALI COMPANY . . 10 East 40th St., New York City

# Calcium Chloride

During April we hope you will remember to mention CONTRACTORS AND ENGINEERS MONTHLY.

# New Features of Highway Guard Rail

NEW features in the design of the Tuthill highway guard rail have recently been announced by the Tuthill Spring Co., 760 Polk St., Chicago, Ill. This new guard rail is built for ease in erection and to give maximum service with minimum maintenance cost.

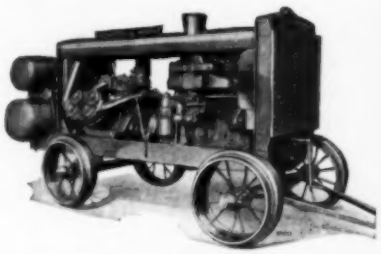
It consists of a 10 or 12-inch wide steel rail, convexed, mounted on a flat leaf supporting spring which fastens to the base of the post. The rail sections are overlapped at the spring support and are slotted at one end, with round holes in the other end for ease in assembly and to permit expansion and contraction. The bolts which go through the rails fasten to the top of the spring. The spring support is of tempered spring steel of high tensile strength and the spring has slotted holes where it fastens to the base of the post, permitting variation in adjustment to keep a horizontal line at the top of the rail.

*The Tuthill Highway Guard Protecting Traffic at a Bridge Approach*

# A New Portable Two-Stage Air-Cooled Compressor

A NEW portable air compressor which adapts the recognized advantages of two-stage stationary compressors and makes them usable in portable units has been announced by Ingersoll-Rand Co., 11 Broadway, New York City. Tests of the new machine show that, size for size, the new compressor will deliver 23 per cent more compressed air than previous models or, expressed in another way, it will produce an equal volume of air with 25 per cent less fuel. The compressor is a two-stage air-cooled unit with two low-pressure cylinders arranged in a V and between them in a vertical position, a high pressure cylinder. The greater efficiency of two-stage compression gives the new portable an advantage in general service and particularly so in high altitudes and in hot climates. Adoption of air cooling eliminates the danger of freezing and keeps the size and weight of the assembly within reasonable limits.

Partially compressed air from the low pressure cylinders passes through an inter-cooler. Cooling is effected by air



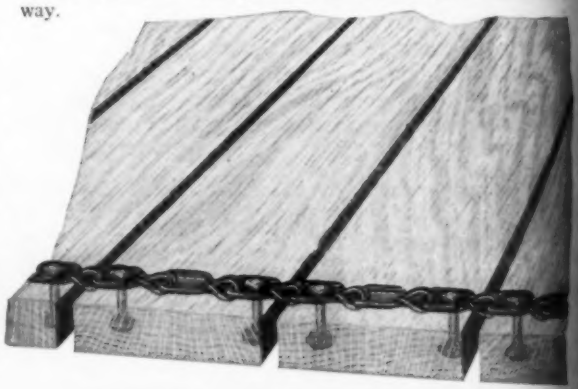
*The New I-R 370-Foot, 2-Stage, Air-Cooled Portable Compressor*

drawn through the inter-cooler network by a fan. The inter-cooler efficiency is such that the air is discharged from it into the high pressure cylinder at a temperature only a few degrees higher than the prevailing atmospheric temperature. The temperature of the air at the compressor outlet is 200 degrees cooler than that from water-cooled single-stage machines. This insures cooler valves and cylinder walls, and simplifies lubrication problems.

A Waukesha 4-cylinder gasoline engine of the heavy-duty type with a patented Full-Power combustion chamber, designed expressly for this service, supplies the power. A clutch for easy starting is interposed between the engine and the compressor. Improved regulation for the compressor is provided. Inlet valves play no part in this and are free to perform their primary functions. The speed of the machine is automatically reduced when unloaded. This new two-stage air-cooled portable is made in four sizes which have piston displacements of 125, 185, 250 and 370 cubic feet per minute. It is obtainable in a variety of mountings.

# Portable Runs for Soft Grounds

PORTABLE runways which make it possible to drive a loaded truck across soft ground without miring are valuable for hauling contractors on road work. One short stretch of soft ground may hold up an entire job. These portable runways were developed by the Safe Play Co., Inc., P. O. Box 352A, Elkhart, Ind. They were originally for the use of coal dealers to enable them to drive trucks on the lawns but have proved their value in other work. They are made of clear oak sections carefully selected and oil treated. The sections are 1-inch thick and 4 inches by 18 inches in area. Each section is securely bolted twice on each end to special heavy galvanized chains of the double-hinge type laid in grooves so that the driveway is flexible and yet of an unusual strength. Each section is guaranteed to carry a gross load of 8 tons on even ground without damage to the driveway.



*A Section of the Portable Driveway, Showing the Arrangement of Bolts and Connecting Chains*

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